

# Jooth Skyle.

# Celebrating The Computer Age

Commentary from: Ronald Reagan • Isaac
William F. Buckley Jr. • Robert Noyce • Ros
Dan Bricklin • Jay Forrester • William Case
Num • Carl Hammer • Marvin Minsky • Joh
David Kay • Walter Wriston • Gene Amdahi
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Baidrige • Koji Kobayashi • Philippe Kahn •
Osbome • Joshua Lederberg • Ed Esber • and

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# Comdex

Preview Coverage begins on page 17

Executive 1.000th Issue of Computerworld/145

Special Section 40th Anniversary of Computing, fol-lows page 264

# 'Open' nets trigger fears Specter of regional protocols

looms as giant headache By Mitch Setts HERNDON, Va. — Comm

HERNDON, Va. — Communications us-rest last week expressed fears that the sev-en regional holding companies may devel-op incompatible Open Network Architectures that will complicate the building of private networks in the 1990s.

Edward Youngberg, director of telecom-munications for the Prudential Insurance Co. in Roseland, N.J., said he is worried co. In Roseiano, N.J., Said he is worned that a lack of standard transport protocols will increase costs for equipment, staff ex-pertise and software and complicate oper-sting procedures as well as hamper the diagnosis and resolution of problems. "Whatever price savings I get from the divested Bell operating company will be

### TOP OF THE NEWS

CW management survey shows bud gets favoring boxes over bodies. Pags 8. A Unix version of SNADS debuts, but

users question utility. Page 9. VM users glory in heightened state

"the other" operating system. Page 12. Britain's Big Bong started off with a big whimper. Page 16.

Texas firm powns "gloss house" after switching to minicomputer net. Page 33.

Applied Data Research last week said it will eliminate 100 positions during the next three to four months. Some of those positions will be cut through attrition,

on trying to connect to the network, said oungberg, who attended a meeting on the NA issue.

ONA issue.

The Pederal Communications Commission, In its Third Computer Inquity order (CW, May 18), required the holding companies to subsist ONA plans by February and the control of the CM, and the commission of the communication of the c

We have an overall concern that we may end up with seven separate, incom-atible ONA plans," said Brian R Moir, the fashington, D.C.-based counsel for the in-tractional Communications Association, the largest users group. At an industry group meeting in Herndon, Moir said that

# Italian PC ally gets AT&T call

By Alan Alper
NEW YORK — AT&T last week turned
to its European partner, Ing. C. Olivetti &
Co., to direct its foundering efforts in the low-end computer products market.

AT&T installed Vittorio Causoni, presi-

AT&T installed Vittorio Cassoni, presi-dent of Olivetti Management of America Corp., as senior vice-president of its newly formed Data Systems Division. It also assigned Olivetti & Co. complete responsibil-ity for the development and production of

ity for the development and production or its personal computers and gave the Ital-ian firm an increased role in marketing its data production in Europe. The Data Systems Division is an organi-zation that absorbs the former Computer Systems Division while adding responsibi-ity for vertical market applications. Cas-

# MIS: 'Treat end users as customers'

By David A. Ludium ATLANTA — Serving the end user a AILANTA — Serving the end user and managing the dispersement of data are the crucial concerns for information systems management, executives said here last week during the Data Processing Manage-ment Association's 35th annual confer-

Users, who "used to be the bane of our existence," pay the corporate bills and therefore deserve to be treated as custom-ers, said Walter McCormick, information systems manager for Wheel Trueing Tool Co. in Columbia, S.C., a manufacturer of diamond drilling and cutting devices. Fur-thermore, McCormick said, "We can no longer snow them with a bunch of buzz-words." His chief goal, McCormick said, is easing, and even instigating, the transition

to enduser computing McCormick said he has been putting data out where it belongs — with the users — and has reduced his staff from 32 to 12 in the process. "The future is in information management, not data processing." he

Owen L. Waltman Jr., an acco systems analyst for the Commonwealth of Virginia, said his attention is focused on decentralization, particularly with the movement of development work to person-al computer-based workstations and greater involvement of end users in the develop ment work.

But Waltman's chief concerns are issue

But Waltman's chief concerns are issues arising from that trend, such as owner-ship, management and access to dispersed data. "Technology has made new tech-niques available. People say, 'I can do this,' but others say, 'No you can't,' " he

Integrating systems that are already dispersed was the top issue cited by Guy A. Fontaine, data processing planner for See END page 6

CW SPECIAL ISSUE

# Serving the computing professional

A sour cover enthusiastically states, this week marks the cele bration of the 1,000th issue of computerworld, the voice of the compu

ing community. To commemorate this milestone, we are presenting our largest issue ever in a collector's edition format. You will find a special pullout section celebrating the 40th anniversary of computing, containing observations from leaders in society, industry and politics, ranging from President Ronald Beggan to writer Issae Asimer Issa

regular weekly news sections. This section includes a personal message from Patrick McGovern, founding publisher, Patrick McGovern, founding publisher, as well as reports from our news staff, on the crucial issues swirling around the management of information systems. We at Computerworld take great pride in our record of serving the even-

changing computing profession. In this regard, we want to give special thanks to our many thousands of loyal readers, who at various times have also served us

We trust you will enjoy this s sue, which, like the 999 issues



# Users opting for in-house integration

### PALM SPRINGS, Calif. — When

PALM SPRINGS, Calif. — When the U.S. Department of Agriculture (USDA) resolved recently to inte-grate lits nationwide collection of 22,000 processors, the agency dele-gated as little of the task as possible

gated as little of the task as possible to independent constructors. Instead, the USDA decided to de the balls of its systems interprated to the balls of its systems interprated to the balls of its systems interprated to the systems interprated to the systems into the systems in the systems

attendene, the USDA's actions illustrated an insportant principle. Buttand are organizations themselves must make organizations themselves must integrately their own prisens, even in instances where a certafa amount of vender analizate emay prove aboutstly necessary.

Interparise their own prisens, even in instances where a certafa amount integrately their own prisens, even in instances where a certafa mount integrated by the consumption of the consumption of the consumption of the will probably never get done, "Lisi said.

Despite glowing advertising claims.

Despite glowing advertising claims to be systems independent of the pricess independent of the pricess independent of the systems independent on the consumption of the pricess independent of the pricess indepen

so une contrary, no vendor has licked the systems integration problem en-tirely. At best, commercial communi-cations products "address only a piece of the problem — and some-times a piece that doesn't need solv-ing at all," according to Network Strategies, Inc. Chairman Richard

### agration at poultry plant

Ray Lollar, vice-president of sys-ms services at Goldkist, Inc., an Attems services at Goldkin, Inc., as Aicatalant-based farm cooperative, said that in six to sine months, he pinas to begin integrating a central IBM 3083 with the IBM System/306 that Goldstone and the IBM System/306 that Goldstone IBM 100 to the IBM 200 to the IBM 300 to IBM

tem/36s to transfer files to the 3083, the integration effort will be under taken primarily by the company's own employees rather than by out-siders, he said.

siders, he said.
Inosically, perhaps the most serious of these difficulties "has nothing to do with technology," according to from Durrell, national sales director with Esectionic Data Systems Copy (EDS). "The biggest problem in integrating systems has to do with people and their attitudes."

and their attitudes."

A convenient case in point is EDS's own parent company, General Motors Corp., which brims with competing "fletdoms that have vested interests and want everything done their own way," Durrell said. "The engineering department may want its own propri-etary computer-sided design system and doesn't care whether it talks to

### PECIAL SOTH

Enlac was just the beginning of who has become an information revolution. Uniforseen developments in comput-ing speed and power have given rise to morel, technological and economic questions. Where is the role of comput-ers in society? How will they continue to champe the nature of work, indeed, the nature of business? A destin-guished cett of commentations offers.

noteworthy opinions on these and of er issues as Computerworld explor 40 years of computing, Follows 264 HEWS

Lotus unveils graphics tool with chart-ing, 1-2-3 integration/ 4 CCA enhances Model 204 data base to communicate with DB2/ 6



spending this year, but no rise in hiring, MIS exect say/ 8

Communications Solutions builds bet for multivendor E-mail exchange usi SNADS/ 6

IBM service program seen as effort to protect customer accounts from inde-pendents/ 10 We WM comes into its own as oping system for and users, software velopment / 12

At Common, users express satisfac with System/36, 38 upgrades/ 13 nicom agrees to buy Centronic nturn for total of \$120M/ 14

IBM names new exactor European on

London Stock Exchange's autometed quotation system fizzles on first live run/ 16 Bell Atlantic takes plunge into micro software mort with financial tool/ 17

Vendors test waters at Comdex with 80386-based products/ 17 The Softwere Link plans to unveil 80386 operating system for IBM PC-DOS competibles/19

Lacking high-capacity software, several vendors enter 80386 file servers in Comdex ring/ 16

resperience limited copy-protection program expected/ 22

Design and photography of pro-tective cover and first inside cover by P. Charles Ladouceur.

IBM DB2 licenses number 1,000, ex-ceeding company expectations/ 24 phone companies sponsor s ofk for universities, labs/ 24

SYSTEMS & PERIPHERALS M denies allegations of 9335 prob ms but limits shipments/ 33 ort predicts this year's disk-drive nue to see lowest growth ever/ 33 by changing from maintaine to mini invironment, Texas gas company layes time, money/33

### ortune Systems bases su in Motorola 68020 CPU/ 37 OFTWARE & SERVICES

Interview: Computer Associates' Wang on company's fast growth and how he plans to maintain it/ 43 APICS is forum for Cullinet manufactur-ing application package rollouts/ 43 Candle Corp. expands its Omegamor

COMMUNICATIONS Datapoint rays up Arc LAN system/ 51 Data communications spending up 44% since 1964, survey says/ 61 Carcel claims ISDN capabilities on

### sice/data system/ \$4 CROCOMPUTERS

ip company contributes chip set to velopment of 80386-based PC AT mostibles/61 us unveils tools to simplify word pro-ssing, operating systems/ 61

cus demonstrates sipha rele ix/MS-DOS tool at Expo/ 61

### MANA GEMENT

nited Technologies' Defense and sace Group forms organization to tie gether data cereters/73 information systems spending rise 8% to 10% this year, study says/ 73 Multiuser systems to gain importance as MIS brings order to microcomputing chaos/ 90

### COMPUTER INDUSTRY

An Wing reflects on his role in the com-puter industry. / 61 Analysts expect Fairchild-Fujitsu alli-ance to be followed by similar consoli-Compaq posts impressive results de-spite slowed growth rate/ 61

Network vendors seek niches in flag-ging E-mail market/ 66 Esprit Systems undergoes metamorphosis by closing micro operation/ 98

### EXECUTIVE REPORT:

When Computerworld published its frex issue 1,000 weeks ago, small systems were nonexistent. Today that technology has forced MIS managers to re-think their corporate roles. As the largest computer industry publication, Computerworld stands with MIS o successfully menage information. By Pet rick J. McGovern/ 148

The new era of distributed processing offers solutions to the problem of pro-viding and users access to the corpo-rate data base. By James A. Mertin/ 151 A decade after its birth, the micro has shaken the foundation of DP. But a shortage of advanced software applica-tions may start future growth. By Douglas Barney/ 163

IBM's 370 architecture already has sur-pleased its expected life spen. Despite issues of competibility and threets from newer technologies, IBM appears to re-main loyel to its erchitecture. By Jemes Connoilly and Jeffly Beeler/ 179 How much has OA benefited productivity? Some experts say technology has been oversold; others admit to problems quantitying improvement. By Devid Ludium/ 196

Despite their strength, major softwers vendors find a giant in the ring as IBM more aggressively penetrates that mer-ketplace. But some say, however, that M will continue to lean on ind nts to fit its product gaps. By Charle



Having led the turbulent computer mer-ketplace into its fifth decade, IBM now conflorts decreasing profits and a con-tinuing maintame slump. But Big Bus-may leave no stone unturned as it strives to maintain its position. By Clin-ton Wilder/ 223

### OPINION & ANALYSIS

Wohl on IBM: Bloodled but still in busi ess/ 27

Connolly on distributed processing commitments/33

Vowell on software design work/ 43 Ulrich on the demise of Zapmall/ 81 Zachmann on NEC's APC IV leptoo/ 61 Clemons on opportunities for stretegic information systems/ 73 Wilder on arbitrageurs in the board-

### DEPARTMENTS

M/ 26 m/ 79

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# Lotus graphics release eases beta user's tasks

### Package results from acquisition strategy

by Designa Basery . — Lottus Development Cope, is scheduled to servingment Cope in scheduled to servingment Cope in scheduled to servingment Cope in scheduled cope in the cope of the cope in the cope of the cope in the cop

Ease of use is a key strength of the product, according to Adrian. "All-though! have been working through confortable with personal computer consfortable with personal computer software, and especially aspone who has ever used a Lotus product, can play their way through it. It doesn't take a rocket actentiat to figure out how to do something." Adrian said.

leged cognitive Desides are of use, the package includes on enhanced import capable. The comment of the comment

in reality graphies. What denitrop publics were all graphies on a ringle peak in the second public of the public o

copy protected.

The product requires an IBM Personal Computer or compatible with at least 394K bytes of random-access memory and a Hercules Computer Technology, Inc. Graphics Card, IBM Color Card or IBM Enhanced Graph-

# Italian PC ally gets AT&T call

money are assumed responsibility for the man assumes responsibility for the profess. Workstates, terminate and profess. Workstates, terminate and profess. Workstates, terminate and workstates, terminate and the profession of the profession who was a second of the profession the profession of the profession the profession of the profession profession and the profession of datas to workstate the profession of the profession and the profession of the profession of datas to workstate the profession of the profession and the profession an

with Olivetti is "solid confirmation of our desire to address both domes-tic and international markets as we develop and deliver a new generation of data networking solutions." AT&T, which owns 23% of Oli-

of data servecting solution." Of victi, has the opinion to increase its biologia in the Isalian Firm is 60% by victi, has the opinion to increase its biologia in the Isalian Firm is 60% by choose the Newton in the Isalian Firm is 60% by the Isalian Firm is 60% by indication that ATRT insense is ex-rence in opinion strategies one with the Isalian Firm is of the Isalian Firm is long at partial profession to the Isalian Firm is a second of ATRT performance in partial profession of the Isalian Firm is a second partial profession of the Isalian Firm is a second partial profession of the Isalian Firm is a second partial profession of the Isalian Firm is a second partial profession of pr

Ringling sees a triad strategy evolving at AT&T Communications and Information Systems as it per-tains to data networking. able for of-

by virtue of its networking equip-ment and services strengths, will handle data management and move-ment, while another partner, per-hape Pujitsu Lad. of Japan, will pro-vide mainframes to handle data processing, Ringling said. If ATAT aligne itself with a main-frame manufacturer such as Pujitsu. Ringling said it could spell the end of the firm's attempt to market the 38 line of minioomuters to commerical

the firm's attempt to market the 3 line of miniocomputers to commercic users. "The 3B would revert to wha it was developed to be: a system for switching or special applications for phone companies such as credit car billing." Ringling said. Olivetti's enhanced role more tha

University annuanced rose more than likely means an end to AT&T's rela-tionship with Convergent Technol-ogies, Inc., the San Jose, Calif., sup-plier of the less-than-successful Jun-PC, analysts speculated. AT&T,

open has been fould represent the control of the co

formation Systems.

The AT&T spokesman said Ed-ard's position is not a demotion but is considered an important job in new data networking strategy."

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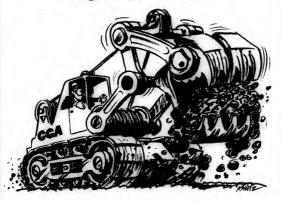
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### MIS: 'Treat users as customers'

nvironment Canada, the nation's deral environmental department and in Bull, Quebec. The department is tablish

ed that others at DPMA were Some conference attendees were re preoccupied by traditional con-ns, such as keeping abreast of con-ntly changing technology — re-ting a theme of the gathering — I the hiring and motivating of

computer professionals.

Technological changes are coming so rapidly that it is hard to know what is on the market and when to move into new tools such as fourth-

er path. "If ou want to hire sality, you do eve to plan that Technological changes are coming so rapidly that it is hard to know what is

BASE on the market and when to more into new tools such as fourth-generation

> Cobbel said re-cruits are interested in what a com-pany can do for their careers. "It used to be you but knew computers were a good field to get into," he hald. Obbel said he also has to respond to established employees with simi-lar anxieties. Those employees, he said, are worried about career direc-tions brought about by changing technology and corporate restructur-ious and are wonderious whether to ings and are wondering whether to remain in technical work or move

# DB2 users target of CCA Model 204 product upgrade

Taxasima Dick Sea. — Atompting in the beautiful paper of its field 504 data has management system (DiBBS, Comparing Crup of America Organica Or

queries written in IBM's SQL. User Language applications may now update D82 files as well, Hart-man added. CCA also asnounced that it in-tends to allow Model 204 to occutst in a D82 shop by giving it the capability to process SQL statements, like D82. That feature will come in Release 10, stated for a late 1987 or January

slated for a late 1987 or January 1988 debut, Hartman shid.

Release 8.0 of Model 204 and User Language will be available in Decem-ber at a price of \$125,000 to \$200,000 for the DBMS and \$40,000 to \$130,000 for Workshop/204, which

\$150,000 for Workshop/204, which includes User Language. The release of User Language includes the ability to excent the Life. Stype verbs, such as SEMD, RECEIVE and OPEN. This command set allows an application written in User Language to automatically engage to communication with DEZ for files or with another application, such as a business graphics package. Under current capabilities, Hartman said, a communication with DEX for files or with another application, such as a business graphics package. Under current capabilities, Hurtann asid, a User Language application could download files from DEX, mix them with files from Stodel 204 and shipben to the graphics application. CCA applicamen call this process-process communications and said it allows enoperative processing it tween two applications. In additi to being governed by a User La guage application, the process-

that govern the communication, CCA spokesmen added that Release 9.0 represents a limited implementation of 1.06.2, with many capabilities still

n said, however, that the

calls and returns of other data base management systems. "It's the difference between leaving a message to an answering machine and talking to the person you cailed," she said. There are other features of Release 9.0. Model 204 previously relied on a hashing index structure that provided efficient access to random data. An ordered index has been added to provide more efficient access to data in sorted sequence.

ed to provide more efficient access to data in sorted sequence. Model 204, which previously in-cluded text handling features in a special Text/204 version, has been given pattern-matching capabilities for data retrieval based on patterns

of words and letters.

Release 9.0 can create a pause within which the data base can be wishin which the data base can be dumped to create a backup and then resume operation without an interruption of the transaction stream. The recovery feature allows a DBMS to operate 24 hours a day without creating a hazard from lack of back-up. Hartman said.

Release 9.0 provides interfaces to external security onclease, inclusions

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And come to think of it, where did you get that tie? VM Software, Inc., 1800 Alexander Bell

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# MIS execs predict rise in system spending

CW survey shows staff plans to stay constant

FRAMINGHAM Mans.— A majority of top MS executive expect speeding for hardware and software to increase during the next 12 months but expect to increase thin-ing during the name period, according to the control of the next 12 months of the next 12 months of the next 12 months of the control of the next 12 months of the next 12

crease.

Only 5% of the executives said
they expect outlays for software to
decline, while 16% said they expect
hardware expenditures to decline.
Several said expenditures will increase owing to acquisitions of other

ompanies.

Regarding the expectation of inreased spending for software, one
secutive observed, "That's the disciton IBM is taking us." Another
secutive claimed to be presently satsated with hardware.

The area of decentralized data

urated with hardware.
The area of decentralized data processing appears to be one major area of increased spending. Piftynine of those contacted by CW's staff said they will increase outlays in that area. Only eight said they expect

a decrease for decentralized DP.

But the executives, who represent a broad cross-section of the U.S. business community and include corporate-level officers at some of the largest U.S. companies, offered a far different view for the personnel stimule.

different view for the personnel situation about, or the respondent situation about, or the respondent situation about, or the respondent project will remain constant during the next 12 months. Thirty encounters a straight of the remain control positions. Only 33% of the survey base said they expect to ingrassers. One executive, anticipating increased hiring, said data surject said will decrease nevertheless "he-cause uners will enter data on his cause uners will enter data on his

Rooming remains level
Comparing their current budgets with those of a year earlier, 25% said spouding is about the same at the spouding in about the same at the get period, while 55% said they are operating on an increased spending level. Looking about, 50 securitive special properties of the special pr

uch spending will decrease in the ver sheed, while 45% said the pending level will remain the same. That's the area where we are cut-ing," one respondent said. ——whasing produced

"That's the area where we are cut-ting," one respondent and.
Lessing vs. purchasing produced an even split among respondents. Asked which method will take prec-sail purchase and 48 others sail lessing. Some of those responses were conditional, with executives saying they are still not clear on the impact that recently enacted federal impact that recently enacted federal participations. Several respondents also said they

Several respondents also sau will purchase lower cost items and will purchase lower cost items and mps, several said they purchase only personal computers, one said he purchases only terminals and perpherais and another said he purchases anything priced under \$500,000.

On \* — On \*

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# Company claims Unix E-mail solution under SNADS

### But users skeptical about protocol's value

By Ellasbeth Horwitt
SAN JOSE, Cailf. — Targeting
companies that need to provide electronic mail exchange among a large
number of IBM and non-IBM systems,
Communications Solutions, inc. is unrelling today a software package
that implements IBM's Systems Network Architecture Distributed Services (SNADS) on Unix-based comreturns.

puters.

Access/SNADS provides a base to build a multivendor network using SNADS, a store-and-forward communications protocol that runs on top of IBM's LU6.2 peer-to-peer networking

Where SNA co

"Where SNA communications re-quires that simultaneous active ses-sions be set up on sending, receiving and all intermediate modes, SNATS accepts the responsibility for deliver-ing the information, queuing up data and sending it when the measured in ready, said Communications Solu-tions sentor communications Solu-tions sentor communications Solu-tions sentor communications archi-tect John Folens. This makes SNADS more suitable than SNA for suitable than SNA for

destinations, he added.
Written for aystems running
AT&T's Unix System V, the package
could be useful to corporations that
want to link their Unix-based aciotific and engineering systems to IBM,
said David Passmore, group manager
of network architectures at Network Strategies, Inc., a consulting firm in Fairfax, Va. Such companies are of-ten divided into "armed camps, one using Unix, the other SNA, with MIS having a hard into a such as the strategies. ing a hard time straddling the

Several MIS managers interviewe by Computerworld had problem similar to those described by Pas more but, for different reasons, did not see SNADS as the right solution. J. C. Penney Co. evaluated several SNA/LU6.2 products, including those from Communications and the communications of the communications.

# from Communications Sommunications S TOP OF THE NEWS

NEWS from page 1 Data General, ending a fiscal year it would like to forget, last week reported losses of \$26.3 mil-lion, or 96 cepts per share, for the quarter and \$29 million, or \$1.07

quarter and \$29 million, or \$1.07 per share, for the year. Most of the ions was attributed to the \$30.9 million payment to Pairchild Semiconductor Corp. in the fourth quarter to settle Fair-child's 7-year-old antibundling

Addressing the problems of adolescent and solut litteracy, IBM last week announced a computer-based system, Principle of the Alphabet Literacy System, designed to improve skills of those who read below the fifth-grade level.

cations software is still several years away, said William Priel, vice-president and director of systems and data processing. "Everybody claims that they have full, cross-system, transparent LUG.2 networking solutions, but we found nothing out there that we don't have aiready," he added. we some nave arready, he sadded. The company has turned to other possible methods to network its ex-tensive installations of IBM and non-

Mestinghouse Electric Corp. is in a similar bind. "We have two commu-nities, engineering and business, which usually exist with a wall in be-tween," said Robert Hodgson, manag-

ing for software tools to enable em-ployees to use the same terminal to access both business and engineering hosts. It has only a limited need for the multi-wedor, multihost document distribution capabilities offered by Access, SNADS, Hodgson said. A galeway now under development at eway now under development at stinghouse will link IBM Profes-nal Office System (Profs) and a stal Equipment Corp.-based elec-

is including 3270 terminal nulation, 3770 remote job entry,

Document Interchange Architecture and Advanced Program-to-Program Communication (APPC). based electronic mail system that can be linked with a full range of IBM

document distribution systems, in-cluding Distributed Office Support Software, Personal Services and Profs. A multiuser Unix system can act as gateway between IBM Personal Computers running APPC/PC or Peral Services/PC and a SNADS net-

Access/SNADS runs in conjunc-tion with Communications Solutions' LU6.2 noftware. Availability is scheduled for March 1987. Quantity pricing is \$400 per node.

### At last.

# the COBOL programmer's guide to IMS or DL/I

BMS for the COBOL. Programmer, Part 1 is a practical book that will quickly and easily teach you crewything you need to how about handling data bears in COBOL using BMY 30na Language L. whether you're working on an MYS yeaten, where DL/1 is part of a larger product called BMS/NS, or on a NSE OCOSYS. (Prom. I over the NSE OCOSYS.) (Prom. I over the NSE OCOSYS.) (Prom. I over the I say "DL/L" I mean "DL/L or IMS.")

To be specific, you'll learn:

 what a DL/I data base is and how its data elements are organized into a hier-archical structure how to code DL/I calls and the other re-quired DL/I elements in your application programs (you use the COBOL CALL statement to access DL/I data bases)

how to check that each call worked right, and why this kind of error pro-cessing is a most in DL/I programs

 the DL/I considerations for coding in-teractive programs under IMS/VS DC teractive programs under IME/VS DC (data communication) or CDC-self you don't have IMB DC or CICS experience, pay worn't be able to write application programs at this point, but you'll be able to apply DC 1 to later training (Part 2 of this erice, available in 1987, will cover IMD DC, our CICS books are described in the box below)

w wise your appacation programs how data bases with HSAM, HISAM, HDAM, or HIDAM organization are used this will give you a best idea of what kind of calls are most efficient for the type of data base you're pro-cessing, and what calls you through

what DBDGENs and PSBGENs are... and what you have to know about them to write your application programs

arrottl)
In short, if you're a COBOL programmer who wests to learn to write DL/I programs, this book will teach you how. And if you're an experienced DL/I programmer, this book will be you ensarer all the complexities of DL/I so you can handle more challenging problems than you've ever tackled before.

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To make it easier for you to master DL/I, IMS, Part I is loaded with practical illustra-tions. You'll End: design and complete COBOL code for 7 programs that do different types of DL/1 processing.

 listings of DBDCIENs and PSBGENs for different types of data bases and pro-. schematics that show how DL/I works hex and character listings of data bus with different types of organizations,

you can see what the system has to do when a data base is created or accessed when it drist neer is required or accessor.

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program examples will save you hours of
work if you use them as models when you
develop DL/L programs on your own.

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# Service plan details emerge while IBM competition reacts

Third-party vendors

ponder strategy, impact

BM's recent decision rrally available disc ion to offer a

ce program to its cust tempt to prevent ind

aintenance providers from en-ceching on IIIM contomer accounts, metals of its Corporate Servi-tation of its Corporate Servi-satism of its Corporate Servi-ration of the Corporate Servi-ration of the Corporate Servi-ration and the Sorbus, inc. division on the Corporate Servi-ration and the Sorbus, inc. division mergram as an attempt by IIIM to lock them out of new accounts. Metals of the Corporation of the metals of the Corporation of the including the Corporation of the including the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Corporation of the Metals of the Corporation of the Corporation of the Corporation of the Metals of the Corporation of the Corpo

is not be arrected.

At TRW, National Sales Manager
e Schelin said be is not terribly
neerned that CSA will push his concerned that CSA will push his firm out of large accounts — or small ones. "I don't think it will have much of an impact on our sales," he said. "IBM is just trying to meet TRW or Sorbus's list price, but they're saking the customer to do extra work. So we're still dealing with an apples an

So far, third-party maintenance companies generate just 5% as much revenue as IBM's annual mainte-nance revenue, which is estimated at

about \$4.5 billion. Sorbus and TRW each generate about \$190 million a year in U.S. maintenance sales, ac-cording to industry estimates. Other

threat of revenue lost to competitors, according to Louis J. Ross, president of Sorbus, is the third-party maintainers' threat to IBM control of IBM multisite accounts. That is because TRW, Sorbus and others represent a TRW, Sorbus and others represent.

While IBM will only maintain IBM machines, third-party firms agree to provide coverage of all machines, even if they include Digital Equipment Corp., Burroughs Corp. or you companies provide equivalent service at discounts of 20% to 30% off

IBM spokesmen last week finally rovided details of the plan. CSA is a der to the IBM customer's existing ers a range of ks." Customers may apply for a ee-year or one-year CSA agree-nt, but IBM reserves the right to

better than one-year agree

year agreements. Discounts also vary by the type of machine covered. The newer 5000 series of maintrames, for example, carries single-digit discounts rates under CSA, while the older 5000 models carry double-digit rates. Shope that have mixted-vendor entirouments have mixted-vendor entirouments the IBM machines in those shope will be maintained.

The key to the plan, IBM says, is that the customer must agree to on-site inspections of all locations being considered for CSA. If the customer has 15 locations and would like to have all of them covered under CSA, then he must pay IBM for 15 separate on-site inspections. The inspection intended to determine whether th customer has adequate troubleshoot-ing capability, cost \$3,500 for each

ection. IRM will rea

rve the right to de the customer CSA coverage, based on these inspections. But IBM will offer to reinspect any site that fails within 90 days — at no extra charge. How will costomers know if they have qualified? "it's no mystery," one IBM spokeswoman said. "Costomers are given detailed requirements of sys-tems management control proce-dures, which they must implement in order to qualify."

ires, which they must implement in der to qualify."
Should the customer decide to ex-ade certain sites or certain ma-times from CSA agreement, IBM will low the exclusions. But there is a malty for withdrawal from the CSA

Although the program locks in dis-counts for maintenance fee, it does not lock in the base price on which the customer may withfraw without the customer may withfraw without penalty should IBM raise mainte-nance fees by more than 7% in the second year or by more than 12k during the third year. Last week, IBM commented that Last week, IBM commented that CSA, it was up to individual customers to contact their account represen-

ers to contact their actatives for full details

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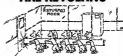
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# VM users see evolving role in dual operating system strategy

### Cite end-user benefits. software development

The IBM VM operating system is emerging with a critical role along-side the vendor's MVS flagship oper-sting system for the 370 environ-ment, according to users and

tance in the IBM 370 line of comput-ers can be seen in its positioning with the recently announced mid-range 9370 Information System. The ven-dor is offering four versions of VM/ SP with the 9370, and users can also run MVS, VSE and VSI on the new systems as quest operating assuments.

systems as guest operating systems under VM.

"I think their direction is to make VM truely equal to MVS in terms of a strategic product," said Mark Tarpin, a consultant analyst in the operations department of Southern Company Services, an arm of The Southern Co., an Atlanta-based utility holding

Industry analysts agree with Tur-pla, predicting that VM will stand with MVS as the two key operating systems of the future. Users who cur-rently manage their shops with both operating systems said they see VM's rule expanding.

ole expanding.
At the American Can Co., supervi-or of VM technical support Randall Porter said the VM enhancements will benefit both end users and pro-grammers. He expects VM to become increasingly important for both end

opment. The company operates an IBM 3003 under VM/SP Release 4 and both a 5085 and a 4381 under MVS. By year's end, the company will have ported VM/SP Release 4 to the 4381 to be used for programming and enduser support, Randall said. The 3083 will continue running MVS for batch-

in the past, programmers have done MVS development and testing on the VM system, Porter said. New VM features such as windowing, which will be included in VM/SP Release 5, are expected to increase pro-grammer productivity.

End-use supplications Additionally, there are a series of new features, such as an easier logon method, that will be important to end method, the series of the installation and the installation and the installation may of its end-user applications, such as analysis and forcasting software from the SoS listification, which is analysis and forcasting software from the SoS listification. Turple at Southern Company Services also discussed the use of both WYS and WY at a lost facility and how the services also discussed the use of both WYS and WYS at the facility and hope the services are services as the services are serviced as the services and the services are services as the services and the services are services as the services are services are services as the services are services as the

The 3090 handles batch process-ag, and the 5880 is used for on-line ransaction processing. Meanwhile, insaction processing. Meanwhile, are are 10 VM systems, ranging on the 4331 to the 3083 in data from the 4331 to the 3080 in Oatas centers throughout the organization. "The VM systems are distributed throughout the organization, at the operating companies and at the nu-clear power plant," Turpin said. "They're used for on-site computing and serve as sort of a front end to corporate, giving access to the batch environment."

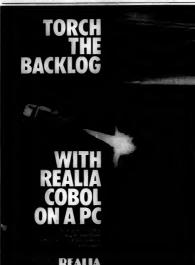
environment."
VM was selected over MVS for various Southern Co. facilities because
"we found in an IBM TSO environment we were restricted. We couldn't
provide the support or do the program development that we needed
to," he said. "This provided computto," he said. "This provided comput-ing access to the users and provided more security to the MVS system." Another user of a strictly VM shop said his company may eventually add MVS to handle transaction-oriented

MVS to handle transaction-oriented applications, Freeing up VM to better manage all other procedures.

Machanian manager of BM the denical support at Northern Telecom, in., "but there is the potential to add uses a 500% at 8281 and three 501% is uses a 500% a 5281 and three 501% is used for all our interactive and batch and the statement of the very well." Analysts also expect VM to e

s a communication-oriented oper-ing system. "IBM is positioning VM the operating system to handle mmunications facilities," said are Fleig, an analyst with the Inter-cional Technology Group in Los Al-L Calif. The new release of VM/SP in

cludes the Transparent Services Ac-cess Facility, which Fleig said pro-vides "core operating support for



# Common meeting draws improved reviews for IBM systems

### Open query file is biggest success

By isen S. Bozman

IBM small systems users
are generally pleased with
IBM's June and October enhancements to the System/36
and 38 line, judging from
their reaction to the recent

mon users group meeti

in Dallas.

Usually, Common'a renowned sound-off sessione
are forums for complaints
about hardware failures and
software buss, At each Common meeting, users give their
views to managers from
IBM'a Rochester, Minn.,
plant, which makes the System/36 and 38 computers.
But this time, those who attended the IBM users' meeting say customers seemed
ing say customers seemed say customers seemed isfied with the improve-

"The enhancements show that IBM has been going back to Rochester with a list of things users have said at Common meetings and doing Albert Barns Jr., president of the New York-based Barns Consulting Group. "There was a lot of assistatedion with the Release SO of the Sys-ming Pacility operating sys-tem," he added, particularly with a new open query file

with a new open query file and This. He feature, amounced in June, was extended to the property of the propert

for the spring in Breen, New-The October Common report-edy draw about 3,000 users, of the Common report-cept of the Common report-cept springs, program of the in a still verting to ab-sort the impact of recent hardware improvement of the common report of the changed than speed up the sys-changed than speed up the sys-matore level. They seemed none curious about recent changes than sargy about "It did seem that most us-ers were satisfied with their "It did seem that most us-ers were satisfied with their "So," said condersone attend-

core most widely installed ma-chine, outpacing the previ-ous record holder, the Sys-tem, 34 it replaced. For many attendees, Com-mon is a place to learn the de-tails about system manage-ment: how to tune the

seminars, ranging from net-work management to commu-nications software to disk-

Common also serves an-other purpose. It is one of the few opportunities during the year for IBM system design-ers and engineers to meet

h hundreds of their cus-ers face to face. The in-

tions asking IBM to include them in the product line. IBM





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# Genicom branches out, buys Centronics, gains Momentum

### Separate deals valued at \$120 million total

sippany, N.J., firm. Momentum was formed earlier this year when New York venture capital firms J. H. Whitney & Co. and Welsh, Carnon, Anderson & Stowe purchased the majority of Mohawk Data Sciences' assets for \$81 prilled

est.

Don Ackerman, a general partner at J. H. Whitney and chairman of both Genicom and Momentum, said last week he hoped the combination of the firms would be completed during the completed during

Stock Exchange company without a printer business," noted President Bob Stein. "We're now looking for an acquisition, but quite frankly, we haven't had time to look because we were too busy running a printer busi-ness. If the acquisition goes through, we will have time to look."

# IBM restructures again, names two bosses to share Europe

ugh Armstrong will

Djurdjevic also none on the move could be a big career boost for Armstrong.

### PERFORMANCE RDBMS FOR VAX/VMS.

At Citibank, in New York, software and VAX\* hardwar were proposed for a relational database requirement. Result? The benchmark test series concluded that:

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The tests compared the Britton Lee Intelligent Dat see Machine against a relational database software water macroine against a relational database software system, running on a WAX-11/785 in a cluster configuration. "On the average, the specialized database machine consistently outperformed the software by a five to one ratio." <sup>10</sup>

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### NEWS

# Open networks trigger user fears

orkable ONA protocols should be in lace before the FCC removes the eparate subsidiary requirement. parate subsidiary requirement.
"This is the major network design sue over the next decade," added enry D. Levine, attorney for the mmittee of Corporate Telecominications Users and a group of w York and California banks.

•w York and California banks. "First, users view themselves as stential buyers of ONA services... coond, there is an interrelationship tween ONA design and the hard-are needed to build networks," Le-

ne said. vine said.

Levine explained that the regional holding companies may resist opening their networks to users. He noted that Southwestern Bell Corp. has asked the PCC to rule that users can-

and the root of the that was can-be of buy ONA services.

With ONA, large corporations with multipoint networks will have the option of putting communications ntelligence in distributed switching intelligence in distributed switching nodes located on customer premises, with only limited intelligence residing in the central office, Levine said. Consequently, he added, "The cost of internal data communications equipment could soar as the cost of buying services from the public switched network would drop." To keep an eye on these issues, us-ers group attorneys and communica-tions managers attended the first meeting of the Open Network Archi-tecture Forum, held by Bell Commuations Research Corp. and the re-

gional holding companies.

The key issue, said John Seas-holtz, vice-president of engineering and operations at Bell Atlantic Network Services, inc. in Arlington, Va. in, "What's the best way to offer to all, providers of enhanced services connections to the network that are comparable both in cost and in qual

comparable both in cost and in quali-ity with those that are available to the divested Bell operating compa-nies for their enhanced servicors. Evelyn Enhank, network services planning manager at Southwestern Bell Telephone Co. in St. Louis, said the holding companies are aware that customers "need the highest de-gree of technical commonality for ONA that is feasible." It is not likely, however, that all seven resional ONA that is feasible." It is not likely, however, that all seven regional holding companies will file identical ONA plans, so the goal is "similarity of interconnections," ahe said. The PCC, particularly Chairman

The POC, particularly Chairman Mark S. Fowler, views OMA as the key requirement for further deregation. Until ONA plans are approved in 1899 or 1990, the regional holding companies may be allowed to enter apecific markets — without setting up separate subsidiaries — if they provide competitors a Comparably Efficient Interconnection to the local





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# RDBMS: THE MEGABUCK

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# London Stock Exchange system overwhelmed on first run

### Poised for profits, dealers left in dark

LONDON — It had to be very DP professional's worst nightmare: The first worst nightmare: The first live run, and the system falls flat on its face. That is what happened? In London last Monday as the London Stock Exchange switched on its submarted appreciate counts. schange switched on no atomated securities quota-on system and became the irst Buropean exchange to mbrace electronic trading and deregulation, in what has become known as the Big

Bang.
Within an hour of opening
for business at 7:30 a.m., the
Stock Exchange Automated
Quotations (SEAQ) system
was out of action, and dealwas out of action, and deal-ers had to return to pen and paper to complete their busi-ness. For more than half an hour, their terminals blank, dealers worked in the dark,

calls for the buying and sell-ing prices the system was supposed to provide. Stock exchange techni-cians pulled the plug on SEAQ after an existing video-tex information system called Topic, which delivers

tex information system called Topic, which delivers SEAQ-generated data, was overwhelmed by inquiries. "It was like the debut of the London Zoo," commented Sir Nitcholas Goodison, chairman of the stock exchange.

Designed to handle a maxi-um of 200 inquiries per inute, Topic went down at sers on more than 7,000 videotex terminals signed on to the new electronic share inon. A spokeswoman for the exchange explained that Topic, which runs on nine Modcomp Systems mini-computers, normally handles 100 inquiries per minute.

Since dealers quoting se-curities on SEAQ are bound to honor the prices that are displayed on Topic, the ex-change shut its systems down for half an hour in or-

der to let subscribers cool off.
London's financial hot
shots displayed a typically
British stiff upper lip sense displayed a typically British stiff upper lip throughout the affair. "It's terribly British to always look for the faults in things," observed Goodison, who bserved Goodison, who asterminded the deregula-on of the stock exchange

The stock exchange was adamase that the problem would not happen again. "We have reprogrammed the system so that it cannot exceed 98% loading," the spokes-woman said just hours after the incident. At peak loads in the future, the spokeswoman continued, Topic would operate on a priority scheme with market makers (securities traders), taking precedent over outside investors who
would have to wait for the
pages they had requested.
The break-in service
seemed to have little effect the fact that oeasers had conduct early business either from the floor of the exchange or by telephoning for quotations, the stock exchange reported twice the normal number of transactions during the morning ses-

nion.

The road to London's Big Bang began in 1983 when the stock exchange agreed with the government to end its rystem of fixed commission for jobbers, or traders, and the stockbrokers who act for investors. Later, the exchange agreed to do away with the distinction between the two groups altogether the two groups altogether and create a new style of trader called a "market makable to carry out both

Not only did the stock ex-change plan to sweep away its traditional demarcation lines, but also open up its nes, but also open up its sors to all comers. U.S. and apanese financial conglom-rates were allowed to join

ion of securities trading is a vital element in London's bid for a place in the international securities scene. The London Stock Ex-

scene. The London Stock Exchange has now spent some \$120 million on new systems and buildings to cater to digital trading.

that mostly that mosely has been seen to SEAQ, a triple Digital Equipment Corp. VAX 5500 system, which receives the buy-and-sell prices of the 62 market makers connected to it and records their actual trades. The market their directly through standard systems of the second trades.

dard stock exchange termi-nals or indirectly via in-house systems that pro-vide their dealers with addi-tional features and propriary information. Until now, it is these in

Until now, it is these in-house systems, which are ex-pected to provide market makers with their commer-cial edge, that have proved troublesome. Although market makers have spent the past year putting them together, some were still strugling to iron out the bugs ays before the Big Bung. "It's all been done so sickly and people have had so little experience that it is not surpising that things went wrong," said Alistair Hardy of the Framingham,

Mass -based market research firm international Data Corp. Some systems were put up in as little as six weeks. Not surprisingly, market makers are edgy about SEAQ.
After the last dress rehearsal
10 days before Big Bang,
there were claims and counterclaims about the system's

shortcomings.

The stock exchange's automation plans are by no means complete. SEAQ does not yet cater to automatic trading, although next year market makers wanting to buy or sell small quantities of securities will be able to do so via a system called the SEAQ Automatic Execution Pacifity. That system will

match an order against the best quote currently avail-able in SEAQ. Lamb is a London-based correspondent for the Euro-pean bureau of the CW Com-munications International



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ALUMINUM ...

# micro software waters

LAS VEGAS — In its first LAS VEGAS — In its first foray into the microcomput-er software marketplace, Bell Atlantic Corp. will unwell at Comdex/Fall '86 its MVP Spreadsheet Plus, a \$400 package aimed at financial modeling and spreadsheet

The package, which was The package, which was originally developed with Gardner Computing, Inc. for Bell Atlantic's internal use, is simed partly at the market Lotus Development Corp.

According to Bett Attanna, e of the product's unique pects is its use of Englishcording to Bell Atlantic, sapects is to use of English-language commands. "We have a model with nine for-muta in it which, if done in the command of the commands in the same and the command of the a thousand formulas to set up — and these are done in plain English," said Dennis B. Lingenfelter, ustiff manage-ment at Bell Atlantic. "You can look at an English script with these English formulas in it and inswedistaly have model works."

The product, targeted at

work groups within corpora-tions, will initially be sold di-rect by Bell Atlantic. "This product is coming from an environment where people want to store a vast ware-house of data on mainframes.

and access it to do financial modeling on the micro, "Lim-genfeiter said.

A key aspect of the work group strategy is the ability to easily share data. "If you import data from one spread-sheet to another, the two

ople that have done the readsheets have to make apreadsheets have to make sure that the cell locations match up when they do the import," Limgenfelter said. "In MVP, you can have two different departments build two totally independent spreadsheets. Then the data spreasances. Inch the data from one can be sent to the other department, and the package will logically sort the data, find all the label matchups and bring in the

price for the sophisticated design of the product; it re-quires 1.5M bytes of hard See BELL page 22

# Bell Atlantic tests the | Comdex to feature 80386 tools

But lack of IBM

support slows mart

By David Bright
If IBM Personal Computer
AT-class power is not enough to meet your microcomputing needs, then Comdex/Fall '86

needs, then Comdex/Fall '86 in Las Vegas is the place to be next week. At least a dozen hardware vendors are planning to introduce or demonstrate Intel Corp. 80386-related prod-

The powerful 32-bit 80386 micromicroprocessor sparked a lot of interest when months ago, but so far only a handful of ly put 80386-ed products on market. Comdex/

the market. Co Pall will feats most 80386 e the activity yet.

But despite the increased activity, the fact that IBM has not yet entered the 80086 market seems to be holding some vendors back. Many vendors are known to have 80386-based systems

waiting in the wings, but Compaq Computer Corp., with its \$6,499 Deskpro 386, is the only major vendor yet to introduce such a machine. Because of the uncertain-Because of the un ty, only half the ven-pected to introduce

pected to introduce 80386-based systems at the show will do so will do so, says Dataquest, Inc. analyst Norm DeWitt.

filliami.

ng's Designo 386 will be joined at Com-

Among the products fea-tured will be personal con-pouter systems, network such sizes bytes on pouter systems, network such sizes bytes of workstations, file servers 1.2M-byte floopy disk drives, and accelerator cards. Sys-tem and workstation vendors sheaming to introduce sys-densing to introduce sys-

Corp., Convergent Technologies, Inc., Wyse Technologies, Inc., Wyse Technology, Inc., Televideo Systems, Inc., Rexxon, Inc., Mitsui & Co. and Future International.

majority of the prod ucts will not be avai A Kaypro spok the woman says the prices of her compa ny's two PCs will be

"very competitive" with Compag's sys-tem. Like the basic Deskpro 386, Kay-pro's higher end model incorporates a 40M-byte hard disk drive and 1M byte of

# MOST COMPANIES ARE STILL LOOKING FOR A HERE ARE SOME WHO'VE FOUND IT:

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- Ameritech Services, Inc.
- · VISA U.S.A., Inc.
- Chrysler Corporation
- · Wells Fargo Bank, N.A.

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Washington, DC	Wednesday, November
Mirrospelis	<b>Wednesday Nevender</b>
Ortando	Thursday, November
Denver	Thursday, November
New York	Tourday November

### Comdex to feature 80386-based tools

From page 17

Convergent is claiming its noreduct is important to the "fut of network competing." The syst is believed to be a small-footprocedutation that integrates Micoft Corp. MS-DOS with a propriets

R Corp. MS-DOS with a proprimar, enabling system. Convergent has emportselly investigation of the state of th

Many renders are known to have 80386-based systems waiting in the wings, but the fact that IBM has not yet entered the market is holding some renders back.

DOS

Thirvideo will show its new sys-tem to OEM prospects in a hotel solte. Given the lack of appropriate 80065 software, it is too early to present the machine to the retail market, any systems product marketing director systems product marketing director

While many of the new systems are little more than scoped-up IBM PC ATS. Because is taking a different PC ATS. Because is taking a different mapping to the state of the state

Vice-President Bob Love. Rezxon is not positioning the system as a pernotation of the system as a perhave the option of purchasting their own copy of IBM PC-DGS to run on 
London-based Parture International is offering to customise in 80085based system for resident and valued option for resident and valued option for resident and valued of recompense and design, office of the present price and resident properties for quantities of 10,000 c more, the 
system's price is said to be less than 
RAGO.

Most of the 80886-based add-in cards now appearing are designed to give added power to ATs for mitch less than the price of a new system. However, Applied Resenting says its board runs in IBM Personal Comput-res, PCXTs or ATs, and Quadrum has designed its product specifically for PCXTs.

conjugated in products specifically for effective for Children Street, Products Dan University Children Street, Products Daniel Street, Name of the Children Street, Products Daniel Street, Name of the Children Street, Name of the Children Street, Products Daniel Stree

Chair II weapsthifty
One reason for the 800M societies
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# TSL to demonstrate operating system for 80386-based PCs

# Comdex to spotlight 80386 servers

ore international, Inc. will a 500 Mype hard disk drive that stell 80236- and 80386-based p computers into file servers. Kaypro's file server is a hig-ration of the two workstatis ill be announcing at the show or will offer three hard disk, or the server, with capacit 70M bytas, 280M bytes and yies. A Kaypro spokeswoman er machine has been designed overly, Inc. 's derwood service While the market waits for 1386-based PC, Multitoch mar anaager James Mong mys.

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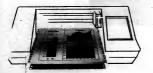
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# Bell Atlantic tests software waters

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cations. Van den Berg said IBM will continue to have two different DBMS lines for a long time, and both will be maintained and enhanced for future use. "It will mean difficulties for a time for people who are trying to use both, but they each satisfy a set of re-

# N.Y. creates info network

### Nysernet will link labs with universities



gateway microsyste

I-N-T-R-O-D-U-C-I-N-G BULLETIN'

### Revised Treasury order covers government EFT

The U.S. Department of the Treatry, responding to complaints from the banking industry, has revised in benating industry, has revised in the curry. Givenilly, has revised in the part of the curry of the control of the curry of

The Treasury Department report ily backed down because it lacks le-il authority to impose the standard

### **GSA** requests bids for D.C. area telecom system

The U.S. General Services Administration (GSA) has issued a request for bids to replace the federal government's Washington, D.C., area telecommunications system with an

overnment customers in 64 build-age and is expected to be a 10-year, 500 million contract. The metropolitan network will

work, called the Federal Telecom-munications System 2000. GSA Administrator Terence C. GSA Administrator Terence C. Golden said the WITS network will cut costs by greatly increasis transmission speeds, connect cal-area networks of microcon via digital circuits, providis ing lomputers ing teleerencing service and allowing

cies to easily change teleph

### IBM plans 9370 version for military applications

IBM's Pederal Systems Division in swego, N.Y., is developing a mili-ry version of the recently as-unced IBM 8370 information Sys-mid-range processor that may be gloyed as a portable analyzer of in-

the process of the control of the co

ercial technology to meet militar seds is consistent with the Pent of a goal of using off-the-shelf technology.

### gy to cut costs and get tech Library of Congress iss optical storage guidelines

The Library of Congress, the world's largest library, has issue what observers are calling landmar guidelines for handling copyrigh

For the pilot project now under way, the library has obtained permission from about 70 publishers. Second, the library agreed to limit the provision of service based on its optical media to the Capitol Hill area. Consequently, private companies of-fering similar services chewhere will

it face compension from Library or ingress services. The Information Industry Associa-tos (IIA), which has members who it reference materials on optical skx for sale to libraries, praised the brary of Congress for establishing

te guidelines.

"These guidelines will serve as an crellent model for other agencies using these issues," said IIA Presient Paul Zurkowski.

### CBEMA bestows awards on allies in Congress

The Computer and Business Equipment Manufacturers Association (CSEAA) has associated the 17 recipients of its new Poblic Policy Tectifients of its new Poblic Policy to the U.S. Congress of the U.S.

mbers of Congress who supported EMA's positions on tax, trade and

procurement issues.

Recipients from the U.S. Senate were Sens. Max Basicus (D-Mont.), John H. Chafee (R-R.L.), John C. Danforth (R-Mo.), Christopher J. Dodd (D-Conn.), Carl Levin (D-Mich.), George J. Mitchell (D-Maine), Bob Fackwood (R-Ore.) and Dan Quayle

(R-Ind.).

Recipients from the Bonse were Reps. Den Bonker (D-Wash.). Bill Prensel (R-Minn.). Sam Gibbons (D-Pla.). Frank Horton (R-N.Y.). Robert T. Matsui (D-Calif.), Norman T. Minnta (D-Calif.). J. J. Pickle (D-Tex.). John M. Sprutt Jr. (D-S.C.) and Ed Zechuu (R-Calif.).



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# VIEWPOINT

### EDITORIAL

# Back to the future

stems becomes gald to all various meniculars.

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has only to try to imagine today's society of computers. 
So computers are consistent of the configuration of the configuration, butters, education, entermant and social actions have become time for a since Blast education disciplines in the 40 stone Blast education and the residual and the size of the configuration of the

puters have served more to ennance and them than to suppress.

Plays no one has had the opportunity to ces this change more closely than the processing professionals whom we have ed during nearly two decades. For 1,000 ns. Computerscovid has chrenicald the traileded growth, technological advance-and industrial trends that have shaped

e computer age. We reported on and helped map the trans-mation from DP/MIS to information sys-ns professional, and we noted with pride dramatic shift in the mind of corporate series toward our readers, ejevating them as a back-room nervice organization to a all and strategic partner in stoering the cor-

rrate ship.

So, in a world where there is hardly a moent to stop and consider the future, we enurage you to join us in celebrating these anwearstes of schievement. Much can be
arned from viewing, with the benefit of
andaight, the dizzying pace of development
computers and the effects on business and

lociety.

One can only guess, with science fictionlike conjecture, what this industry will look
like in 2006, when we celebrate our 2,000th
saue and are planning the 60th anniversary
celebration of the information age.



### LETTERS TO THE EDITOR

### SQL: Taking the long way around

SQL: Taking the food way around I read Replan General's article on threchard administration of the special control of the solution to "find supplies assess for supplies of on parts" a like life from San Passacous to on parts. The special control of the parts of the special control of the Control of the special control of the Control of the special control of the parts of the parts of the special control of the parts of parts of the parts of the parts of the parts of the parts of parts of

Gerard J. Carney Carney Associates Jountain View, Calf.

# The obsolescence of Grosch's Law

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the foreign the matter of the compacts agritions ticreases at a rate equivalent to the expensive systems ticreases at a rate equivalent to the
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mediate, folks, and save another fortune. The
yours ago, it was microprocessors. That a personal
compacts on every desir, folks, and save a third
compacts on every desir, folks, and save a third

orvune.—
Another era may indeed be dawning — super-computers. This time I thought my bedraggled old law was safe, since if supercomputers fly, it will be because fast is cheap (as I have been saying since 1950).

No. 15 the state of the same of

1960). Not so! In the article, "Boeing plots to furnish users with supercomputing capability" [CW, Sept. 29], Boeing Computer Services Co. virtually says: "Get your misisupers here, folks, and save that last fortune you've been hanging on to." I couldn't

last fortune you've been many believe id
Bere is an outfit that actually uses Cray computers and knows how powerful and rewarding they are. And they are claiming that slower manifest are better?

Well, as I said when I started, the CW article makes it official. The supercomputer era is here You can tell by the customary designation of my poor brainchild.

### Hot DP careers versus cold facts

Hot DP careers versus cold facts

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# VIEWPOINT

# Big Blue: Down for the count but not out

BM-bashing is a popular sport these days. When anything that big and that successful for that nog shows even temporary feet of lay, joy in certain quarters is per-

clay, joy in certain quarters a parkapi nevitable. On the other hand, reports of BWI death are, to paraphrase Mark Twain, greatly exaggerated. So are tumore that IBW is about to disappear from any of its segarificant markets of the segarificant markets o

This is not to say that IBM doesn't emetimes guess things completely rong. IBM guessed wrong about infocomputers, permitting DEC to art and succeed in a virtually new dutatry. IBM also guessed wrong cout electronic typewriters. It

Whil is president of Whil Asso iates in Bala-Cynwyd, Pa., and edi or of "The Whil Report on End Use

thought they were a continuation of the other control of the contr

Think of the IBM Personal Com-uter. IBM wasn't first in the market. probably doesn't and never all ave the best product. (If that mean schnical superiority, best price or hatever — you decide.) But it rought IBM's unique contributions

It validated the product for busi-ess users. That is, IBM's entry sig-aled to the entire business commu-

all of its competitors.

• With its enormor

its enormous installed base ers and ability to attract a with its emergence of customers and ability to attract additional customers to any market in which it chose to compete, IBM could address a very large market. Therefore, it could build products ly a very few vendors.

only a very few vendors.

• It provided an assurance of marlet size (and supported that available market with openly published
information about its PC products)
that enticed third-party hardware
and software developers, in largely
unanticipated sumbers, to build
products for the IBM PC environment.

 It provided a large, very stable window in which competitors could succeed by offering IBM-like prod octs at better prices or by enhancing the basic IBM product model while maintaining the IBM compatibility that is the basis for this market ac

The Giant Killers — those who are constantly seeing fatal flaws when what is happening are course corrections — assume that IBM doesn't apply a problem of the course cour

# By HOWARD G. ZAHAROFF People in the computer indus-try will not be pleased to be a shout another computer-relat-ed liability. That's because the one hat spring to unind cost them money-misrepresentation, strict product shallty, breach of warranty, nigil-gence, even computer malpractice. (The last inst testablished yet, but re-

computers

The liabilities of not using

cent cases secon.)
But, what about the notion that one might be liable for failing to use a computer? Can the law require you to spend money on a spend money of an it.

READER'S require you to be-

hnology so the you can make an informed choice? Could the law be so intrusive? The answer is yes and no. Typically, the law will not force an individual in his private capacity to become expert in technical areas, spend substantial time selecting from available services or goods or spend money on

Still, the law will occu Still, the law will occasionally re-quire a private citizen to make cer-tain expenditures or spend time in a certain way. For example, one must file tax returns, make sure that one's land is not unreasonably dangerous to children or passersby and keep one's car in safe condition.

However, in general, I am not thinking of individuals in their pri-vate capacities, but of businesses, businessmen and professionals. For example, I can imagine a hospital, clinic or doctor being held liable if a patient was injured as a result of failpatient was injured as a result of fail-ure to use a proven diagnostic expert system. I can envision a law firm be-ing found liable for failing to discov-er a critical precedent it would have discovered had it used cost-justifled. uscovered had it used cost-justified, computer-based research tools such as Lexis or Westlaw. And I can pic-ture an architect, builder or suto manufacturer held liable for damage or injury caused by a defectively de-signed product when use of available computer tools would have prevent-

both old and new, for this type of li-ability. A classic example is T. J. Hooper, a 1932 federal case involv-Hooper, a 1932 federal case involv-ing barges of coal lost off the New Jersey coast in an easterly gale while being towed by two tugs, the Mon-truer and the Hooper. The tugs were and unneaworthy "because they did not carry radio receiving sets by which they could have seasonably got warnings of a change in the See LIABILITIES page 31

ed the error

# The blessings of a baffling blizzard of buzzwords

BY DAVID H. AHL

There was a time when bureau-crata and sociologists were the only "in" groups determined not to be simple but to use acrosiyms and complex language where a few staiwart English words would serve equally well. Other "in" groups, con-vinced these people were on to some-thing good, but not quite sure what it was, started to produce their own increes.

As the trend spread, a small band o loi-fashioned language mavens tiled against the use of such jargon, casionally using such harsh hrases as "murdering the English nguage" and "ideas lost in the mare complexity."

But they missed the point. Jargon basically good. It is descriptive, mpact, colorful and versatile. And occasion, it lends an air of respectollity — even unapproachability — the user. Let's examine some of the

to the user. Let's examine some of the virtues of jargon is more depth. Jargon is concise. Consider these headlines from recent issues of vari-ous computer publications: "DDE protocol integrates Windows applica-tions," "Honeywell ties OA, DP, oth-re systems," "Quatoms Service slaps duties on Japan OTP EPROMA" and "IFF RISC designer exists for start-up." These headlines are clear and

Ahl founded Creative Computingatine and is the author of mount 20 books on recreational, ed

ociae. Everyone in the business over what they mean. How more ther that is than having to explain at DDE means dynamic data ex-ange, OA, is office automation and data processing. And surely OTP. FOMs is better than saying one-me programmable erasable pro-sumsable read-only memory chips.

"Beign separate those in the low from outsiders. Consider these two beatlines." Tool targies CIS crashes" and "Linear Pech gets section and "Linear Pech gets sections," and "Linear Linear Pech gets and "Linear Linear Linea

Several years ago, I sat through an hour-long lecture given by a top exec-utive from Hewlett-Packard Co. about the wonders of RISC. Not once about the wonders of RISC. Not once in the lecture, I saked a perfect in the lecture, I saked a perfect stranger what it was — I was certainly not going to admit my ignorance to someone who knew me — and he langhingly told me the defliction. This is not an approved way to discover the meaning of jargon, but I

as desperate.

Jargon gives credibility to the prossion. Imagine how you would feel
out a stockbroker who did not talk
out P/E, RDE, historic multiples,
PS, yield support levels and Ginaie

Mass. You would not respect him and might regard him as an ordinary per-son rather than a knowledgeable ing your conversation and writing terms like PC, MIS, LAN, token pering your conversation and with terms like PC, MIS, LAN, token-ring and VAR will easily convince outsiders that because they don't un-derstand what you're talking about, you must be a genuine computing

Jargon can meet the needs of spe-al situations. Say a salesman is exling the virtues of a wonderful w data base. You reply, seemingly nocestly, "Well, dollars and sense innocessity. "Well, dollars and sense is no paradox, but sometimes I prefer to consult my guru." The salesman thinks to hisself, "I've got this guy; be wants a sensible approach. I just have to show him that I can be his

iru."
Imagine your triumph when you ter explain to this pitiful excuse of salesman that he should have sown all slong that you meant that onogram Corp.'s Dollars and Sense tonogram Corp.'s Dottars and Sense schage is not as powerful as Anna-oftware Co.'s Paradox data base, ut that for certain investment deci-tions, the Guru package from Micro lata Base Systems, Inc. is even bet-

So next time you're tempted to seed the admonishments of William after, Edwin Newman or some other sure, Edwan Newman or some other nguage maven who says that jar-n is simply a blizzard of buzzwords rying thought, remember the vir-ne of jargon — its conciseness, dibility, versatility, importance to



Decision to energy of networking to your business. Next data" services will let you share victor, data, let, and maps also your share victor, data, let, and maps also your share without management tools into one cost-efficient resource gives you a competite a dentage. Also for Medician services, provided through Northern telecom produces. Available from phone companies and other suppliess of communication systems.



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### Big Blue: Down but not out

those strengths to new problems. The have learned to respect the fig. Sites gazar, neverthelms knowing its faults — believe IBM may veer off its respective to the fig. Sites site, resources and custome legally count. Those smart people, perhaps in the fig. of the fig. site of the BM's biggest resource, will everthelm-lik's biggest resource, will everthelm back on the right path. and put IBM back on the right path. BM tells us that its amounce-ments in October are an example of While the gazar killers murrow that a

bers that much of its customer base is elsewhere, in very large companies where the major computing resource is not how many mainframes or milon instructions per second the com-any has, but how many computer rogrammers and what kinds of kills they have.

programmers and wrate times of in that environment, IIIM is largely right. Expanding the compatible topic programmers are also as the compatible topic programmers are also as the compatible tomers to build steadler applications within the same computing environ-tation, take note) DEC hasn't been very successful yet in selling but yet made to be the compatible to programmers are also as the monte for conventional, 370-compatible successful programmers are this part of the market, making it hand for everybody to sell and partly due to 370-compatible operating op-mand application software is made and application software is programmers.

nee.
In fact, it is scalable, compatible operating systems and lots of third-party applications software that has made DBC so successful in competing against IBM for the hid-range market. There the customer may seek unrikey solutions and may not necessarily be so concerned with compatibility, with making man operating systems of the seek of

Of course, the question lies in when we will see the impact from these particular mid-course correc-

### 77

The 80386-based next-generation PC could permit IBM to maintain the high growth rates it's looking for.

ns that shore up the weak, mid-age processor part of IBM's prod-line. I believe that the lag cycles d, therefore, the continuing short m problems in revenue, may be ager than IBM thinks. Bringing up new applications

Steam Polanesses at revestate Polanesses at reveBringing up new applicawithin the 370 big-castomer me 
takes time. If a flowes the real in 
of the 870 product line, base 
870 product line, base 
870 product line, base 
870 product line, base 
870 to take of and liable to 
870 to take of and 
870 to take of 
8

But this ignores the big IBM en-monement we're all waiting for C.
is the commission of IBM's new defrange processors, the potential offerure is the commission of IBM's new defrange processors (as yet one powerful workstations that adult permit IBM to manicant the water to commission of IBM's and the commission of IBM's and one suppress of IBM in the next instry of room in the marketplace for tening and new competitors to

# "Introducing The First Preview Termi for Laser Printe

The until now there was no way to preview or your WAX. You had to use a for a language on the common that the common that the common that documents. You was never sure what you were printing until it was printed. The way to be the common that with reference or the Common that when the common that the common that some was the common that some that the common that some some

memory for speed, and pan and zoom for graphics editing. Plus Testronix emulation and opinional ReGST emulation.

"And the Talants 7800 axis like popular alphanuments terminals such as the VTSX, VT100, VT220, and VT240. So you can talk to your WAX h just one terminal. Couple the T7800 with one of our Talar er Printers, and you have the Talaris Prev sing System, the most advanced and Printers, was a read advances a stable printing severe new table printing severe new dock printing system is general for the first printing system is general for the first printing system is general for the first printing system in the system of the printing system is buy working on new software catenations. And if Bury's working on it, you know you can depend on versatility in into the finance.



# Liabilities of not using computers

Contra equido directions. Lead you conclude that it will be many years before computers will be many years before computers will be many years before computers will be made years before the product of the product of

### Hot DP careers vs. cold facts

pained, then the new employee can najor about five years of worry-free bo efforts. Then comes a period from he mid-50s through the early 40s to be seen to be seen to be seen to be then the older, experienced employ-ee are in danger of being invanished, the company of the seen to be seen and those over 40 find the doors, to appear to the seen to be seen to be appeared to the seen to be seen to be appeared to the seen to be seen to be appeared to the seen to be seen to be the seen to be seen to be seen to be the seen to be seen to be seen to be the seen to be seen to be seen to be the seen to be seen to be seen to be the seen to be seen to be seen to be the seen to be seen to be seen to be seen to be the seen to be seen to be seen to be seen to be the seen to be seen to be seen to be seen to be the seen to be seen to be seen to be seen to be the seen to be the seen to be the seen to be the seen to be the seen to be the seen to be the seen to be the seen to be the seen to be se

blem until morths after the trip. The court reasoned, "Plaintiff in Air equid have prevented the smagner from uning altered tickness maintaining a system capable of filming which passengers are decided for a particular flight. In the of the selvanced computer technique with the today wallable today, this is not an reasonable burden to place on the until?".

in the advision industry."
Two points stand out in this decision. First, unlike the court in 7. J.
Brooper, this court believed that the
"accepted practice in the airline in"accepted practice in the airline infautt," was the standard by which
to judge Swiss Air innocent or at
fault. Second, the court never deat
that a business might be liable for

# **HOW TO TAME** THAT PAPER TIGER

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# **SYSTEMS & PERIPHERALS**



HARD TALK

# Sell substance. not buzzwords

he buzzword of the 1970s —
distributed processing, also
known as departmental processing — is back in the computer industry's everyday vocabulary. It has been
popping up in business publications,
product announcements and manageproduct announcements and manage-

The financial success of Digital Equipment Corp., the financial woes of IBM and IBM's own announcements of IBM and IBM's own announcements of the past six months — the System/36 and System/38 additions, the emphasi on networking and the 9370 introduc-tion — have driven speculation and flat-out predictions that smaller sys-

tems are the way to go.

Of course, the skeptic might note
that distributed processing was also the
way to go eight years ago when IBM
took the wraps off the 8100 series,
which is still slipping toward one of the
industry's more painful deaths. And
even DEC was successful, if not Wall

treet's darling, for its first two de-But it is obvious that some continued shift toward distributed processing will

continue for several years and that suc-cess awaits the user and vendor compa cess awaits the user and vendor comp nies that can best implement distribu-ed processing solutions. Unfortunately for some companies both the user and vendor communities simply making commitments to distri-uted solutions does not spell success.

Some of the lucky ones, at least on he vendor side, have been DEC and

Connolly is Computerworld's seditor, systems & peripherals.

# IBM restricts 9335 delivery

Newsletter hints access time setbacks responsible

By James Connolly
Amid speculation that access tim
have fallen short of what was promise

have fallen short of what was promised IBM has restricted the number of 8338 disk drives that it will ship to individual stomers.

IBM officials deny there are any perfo ance problems and claim that the restri

tions — for example, a customer with one IBM System/38 processor can receive only one 8036 — are due to unexpectedly high demand for the 855M-byte drive, which anounced in June. But reports persist that IBM either stopped or limited shipments after discov-ering that access times failed to meet the promised 18-msec average because of mi-

The performance problems were cited in a recent newsletter published by com-puter dealer UC America, Inc. and were raised during the meeting of Common, an IBM usees group, two weeks ago. Attendees at the Dallass Common meet-ing said officials from IBM's Systems Prod-

ucts Division in Rochester, Minn., assured them that the 9335s are performing well but added that there may be some prob-lems in the way that the disk systems con-

ct to hosts.
"What we found is that IBM made the "What we found is that IBM made the first wave of shipments of the \$635 and actually may have found them to be slower than the 3370," said UC America Presi-dent Charles G. Hanna. He said he was con-tinuing to investigate the performance re-

When introduced June 16 for August liveries, the \$635 was offered for use th the System/38. However, since that ne, IBM has introduced the \$370 mid-

NOSA. When saked about reports of problems, a spokensum for IBM's Information Synapsis and there are no performance problems and there are no performance problems and there are no performance problems and the substitution of the similar property of the similar property of the similar property of the succeptored demand. However, the spokensum later corrected that to state the product was shipped in time and was still being shipped. Be then reported was still being shipped. Be then reported the pre-customer limit, period relation to

the per-customer limit.

As an interim measure, IBM is continuing a special installation program announced with the 9335's introduction. Under that program, customers who order 9335s reportedly can receive the older 3370 free of charge for use until the 9335

### INSIDE

IBM's 9370 pres sures makers of low-end plug com patibles/36

> Fortune Systems adds 68020based supermi cro/37

> Perceptics aims optical disk sub system at VAX market/37

HP announces rugged, high-capacity disk drives/36

### NEW THIS WEEK

 Datachecker of fers 32-bitbased point-of-

sale systems other new products, see pp. 115-143.

# INSTANT

"Software is the heart of our business. Software is what we offer, and the hardware is something that goes with the

# Slide seen in growth of fixed disk market

By Eddy Goldberg
LOS ALTOS, Calif. — During 1986,
worldwide revesue for all types of rigid magnetic disk drives is expected to rise only 9.7% over 1985 levels to \$15 billion, rking the first time in the 1980s that

annual revenue growth for this market is expected to fall below 15%.
However, a resurgence to a 19.6% annual growth rate in the 1987 to 1989 period is predicted in the recently released 1986 Disk/Trend Report, published by Los Al-

# Mainframe-to-mini switch lights fire under gas firm's MIS

### 'Glass house' grows cold as VP pilots switch

A cost-cutting mandate from top anagement and a "strong sugges-on" to reduce its MIS head count led ural gas company to traditional IBM main-

inicomputers.

In addition to throwing out much
its complex centralized mainframe
veronment, El Paso Natural Gas Co. environment, El Pano Natural Gas Co. eliminated 8.5. million in operating costs and 33% of its MIS work force over a period of four years. The com-pany also sold a \$6 million glass house it no longer needs, according to Robert Evans, vice-president of plan-

ning and information systems.
"You can do more with less," Evans said. The gas transmission firm, with \$3.7 billion in 1995 revenue and 4,000 employees, faced dollar cutbacks and increasing end-user demand toward the end of 1992.
"We evaluated the status.

e evaluated the status direction of our situais on res us told more than 100 addes during a presen-

The gas company want-ed to put more users on-line, update its application software and add

fits — all of which required a tools and more staff. "The comple ity of the mainframe environment

managing it."
In 1982, El Paso Natural Gas had an IBM 3083, an IBM 3083 (upgraded to a 3081KX in 1983), 68G bytes of direct-access storvice (DASD) cap tations and a 20%

growth rate. Most of the equipment was housed in a building that bad been

several ianguages, ran mostly batch processing. The firm had installed IBM's IMS/DC facility for on-line use

at found it costly, time co ad inflexible, Evans said. Major users groups within the company had their own satellite data processing groups, which led to distes over, or advocacy of, indi ual pieces of software, Evans said.
"One financial software system had 13 versions for different groups, ed. When senior management ar-

sed that there was no reason for gued that there was no reason for costs to grow at such a rapid rate, MIS responded that it was only get-ting the users what they wanted. Management did not accept that expensive growth was the only op-tion as existing ways instituted to lead them.

tion, so stud ies were initiated to look nto alternatives. After the studies

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programs, and resources. Emericany and cost-enecuvey.

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We also have Motorola corporate alliances—a unique program of vertical technology integration from silicon to systems to solutions. Because of it, you get not only better solutions but greater reliability and faster delivery. And through Motorola Credit Corporation, we can offer a variety of financing alternatives.

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# IBM 9370 line puts pressure on lower end PCM makers

The printers of Texas The printers you need when



# Unix System V, Motorola 68020 ingredients in Formula

Fortune soups up supermicro line

James Connelly BELMONT, Calif. — For-se Systems Corp. has re-nged its line of supermi-computers with the nouncement of systems

those processors. Control and the State of t

such as communications, manufacturing and engineer-ing. The officials emphasised that use of industry-standard hardware and Unity spro-vides users with an upgrade path and cases development of software by dealers and value-added resellers. The 32-bit CPU runs at

16.5 MHz and processes in-structions at a sustained rate of 2 to 3 million instructions per second (MIPS), and in er second (MIPS), and in ursts at 8 MIPS, the vendor id. Memory management is the Motorola 66461 or

processor is optional. Basic randow-access memory (RAM) is 1M byte and 16 M byte with 11k. 14k. and 16 M byte with 11k. 14k. and 16 M byte with 12k. An optional Portuse-Link Controller is designed to all with 26 M byte with 12k. and 16 M by

ersonal computers. The company said that an try-level configuration, in-uding 1M byte of RAM, a M-byte hard disk and a M-byte streamer tape, ets \$21,900.

# Optical disk subsystem boosts storage

By James Connelly
KNOXVILLE, Tenn.—
Perceptics Corp. has announced its Lasersystem digital optical disk storage system for Digital Equipment Corp. VAX and Microvax

The subsystem includes an Optical Storage International Laserdrive 1200 disk drive, an Emulex Corp. UC04/14 an Emulex Corp. UCO4/14
small computer systems interface host adapter, Perceptics' Laserware optical dissoftware and support.
Perceptics claimed that
the Lasersystem provides
full on-disk VMS-compatible
disasteries.

full on-disk VMS-compatible directories using Perceptics Worms-11 optical disk format. Piles may be deleted, reservate is compatible with VMS utilities such as Backup and Digital Command Language commands. Application programs may use standard I/O statements. A Leasurement

ard I/O statements.

A Lasersystem configuracon costs \$21,950 for one
rive, a DEC Qbus or Unibus
tapter, a Laserware endser license, cables and rackcount sildes and documents.

On. Additional drives cost

Instruments. your needs are demanding.

tenium performance and industrial itys. That's what IT pirenters are on for. Their reliability has always in sending the straining that's suphuse, consistently high. And or quality suppasses the needs of their factories. Which means few, if any, ness and a minimum of downtime. In , about all the service a IT printer do is a paper or ribbon change. The reason is imple—every II ster is made to do its job very well, were long time.

inter is made to do its job very wex, a very long time, set blood 810. The workhorse. For almost a decade, the Model 810 my-deep 150 ops system printer has en printing forms and data appears initially usastemeded operation. In referenance has been no reliable that the choice of most of the work? In the choice of most of the work? In the choice of most of the work? In the choice of the work of the choice of most of the work? In the choice of most of the work? In the choice of the work of the choice of the work of the work of the choice of the work of th ets, they aren't making money. even took the 800's field-proven ecture and put it to work in our il 880 system printers. You can't

covincement.

The TI Omnil.seer family of prints in the very first of the second general fuser printers. Why did we wait!

of laser printers. Why dad we wait: Laser printers of the first generation couldn't live up to our standards for function, quality and reliability. In fa-our Osmill aser printers are documents to last up to 15 times as long as their

to last up to 15 times as long as their finer generation counterpurts, with the lowest cost per page in the industry.

To be TI printers, the OtuniLaser had point unerstright as incredible speed with unrivaled quality. And they had to be simple to use. The Osmalizaer Model 2015 will last in threed-resource work environments where leaser printers ful. They had to be the "810" of laser nerview.

printers.

So if you're equipping a computer system with printers, or replacing those you already have, demand the printers that fit your demands are considered to the printers.

1.600-527-3500. For the printers of





TO THE REAL PROPERTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY

# HP introduces rugged, high-capacity disk drives for minis

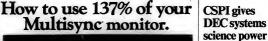
### System counteracts dislodging of heads

y Hannery Babe Magnads
PALO ALTO, Calif. — Hewlettnekard Co. has announced a formated
of 571M-byte disk drive designed
or use with HP minicomputers and

The 307M-byte HP 7896 and 571M-byte HP 7897 are compact and rack-mountable. They are built with ad-vanced Winchester technology and are the first 8-in. HP disk drives that are sputtered this-film media — a filek-manufacturing process that

movement and 8.5 maer. for rotation-duction, T. Sad driven support data to the control of the control of the control of the treatment. The driven support data to the control of the control of the control of the supportant channel transfer rate. The IP 7906 and BP 7907 case up to predocease, the IR 7905. The driven also containe laws power and require less air conditioning than the IP. The IP 7906 and IP 7907 can be control of the The IP 7906 and IP 7907 can be control of the two calculations, with one holding two drives. A 19th. Exercises in two calculations are designed in the control of the driven of the IP. Exercises in the control of the IP. The control of the two calculations are designed in the control of the two calculations are designed in the control of the two calculations are designed in the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the two calculations are designed in the control of the control of the control of

volatile, single-item "write cache."
The cache improves performance in some HP 3000 MPE-V and HP 1000 system applications. The disk-controller cache can be included at time of shipment or purchased later as an



By David Bright
BILLERICA, Mass. — CSP, Inc.
(CSP) has introduced a line of at-tached 32-bit array processors it claims offers the best price/perfor-

Offering performance ranging from 38 million floating-point operations per second (MFLOPS) to 280
MFLOPS, the Mini-MAP XL models attach to Digital Equipment Corp.
VAX, Microvax and PDP-11 systems

normal with large data memory and the state of the state

array processors attach are also in-creasing in price/performance. Greene said there is still a big need for vastly increased computations in specific scientific applications. By concentrating on specific computa-tion-intensive tasks, array proces-sors can free up a system's CPU for



control BGA, you QuadEGA ProSync With QuadEGA from you can display this much dan. BGA mod

# Parallel Computers inks service agreement with RCA

by James Cosmolly

SANTA CRUZ, Califf.—

Parallel Computers, Inc.,

which claims its fault-toier
nt systems can be service

ror half the cost of nonfault
olerant computers, has a

nonconced an agreement under

which RCA Business Services

On will service Parallel in-

# Sell substance. not buzzwords

NCR Corp., which drifted out of the mainframe business in favor of the supermicrocom-

ffice automation, with ere lines of business in be-en. Now DEC Chairman Chief Executive Officer meth Olsen says his com-y, once thought of as a dware company and ther moted as a networking dor, is actually a soft-

ith a new len

service on an 8 a.m. to 5 p.m., five-day basis costs 10% to 12% of hardware costs with

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### SYSTEMS & PERIPHERALS

# Mainframe-mini switch lights fire

MS decided that misicompoters had devirating in price/performance and that growth would be easier to control with misin. The smaller systems offered better development and manifestance tools, spread the risks proposed the risks proposed time. In the same time, and the same time is a small state response time. In short, EP has Nitaria Gas could do more work with the hardware, Paran sweders — 20 of risks proposed the same time of the same time. The same time is the same time of t

performance, application de-ent tools, ease of use, geo-cal support for remote sites emmunications with the IBM ames, because at that time the mainframes and distribute mainframes and distribute

entral mainframes and distribute he minicomputers.

MIS chose the Wang VS systems ased on the factors listed above. We chose the Wang system for data recessing, not for office automation. fe did not consider office automa-ion factors in our criteria," Evans

e current installation includes ang VS 300s, three VS 100s, 600 wang VS 300s, three VS 100s, 600 g workstations, one Prime Comr, Inc. 9955 used as a modeling of the control of the control

The 20th less was desching. The 20th less was destined to 00% of that is destinated, with a few or that is destinated, and the second of the s

sulface a year. Even each. "Bore or a sill and the property of the property of

operates, the Wang VS 100 costs \$60,000, the VS 300 costs \$60,000 the VS 300 costs \$60,000 the VS 300 costs \$60,000 the VS 400 the V

response time we are getting keeps the programmers at the deak because sow programmers at the desk because they never have to wait for ensults. This gives us increased productivity. Programmers/jobs have expand-ed to include job administration and quality assurance functions, and staff members have responded well to the increased responsibilities, ac-cording to Evans.

After living with 106 modifica-tions to IBM's operating system, Ev-nas is glid that Wang does not allow alterations of its operating software. Batch programs can be developed three times faster than on the main-frame because of interactive compile and debug festures; there has been a tenfold increase in on-line productiv-ity. Prototyping features allow for rands development of system shells.

sty. Protocyping leatures anow for rapid development of system shells, Evans said.

New programmers with knowledge of only Cobol can be productive in two weeks, as opposed to a six-to nine-month training period for new programmers using IBM's IMS/DC fa-cility, he added.

Evans was able to decrease MIS staff from 309 in 1982 to 203 today. The administrative function drooped

from 35 workers to none. Ten appli-cations programmers — out of an original 74 — left, and client support

Areas that have increased are sys-tem support — which give from happyre — which give from computers and communication func-tions — and a few applications pro-ting in the support of the sup-tion of the support of the sup-tion of the support of the sup-tion of the support of the sup-rent properties of the sup-tion of the support of the sup-rent properties of the sup-serior of the support of the support of the support of the sup-port of the support of the sup-serior of the support of the sup-port of the support of the sup-port of the support of the sup-serior of the support of the support of the sup-serior of the support of the sup-serior of the sup-serior of the support of the sup-serior of the sup-serio

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obstely.

For the first time, a PC and a cistosts can really talk together. ply, transparently, reliably.

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on a PC, for example, and modify them on your Macintosh under MicroSol\* Excel\* With TOPS, PCs can also talk to PCs. Macintoshes can talk to Macintoshes. All of these computers can be connected on the same LAN.

ing up parts of your office that until now were barely on speaking terms. Installation is quick and smight-forward—less than four minutes for a Macintonh, fifteen minutes for a PC. It's all done so easily and suc-cessfully that within the first month TOPS was svaliable, it was already

### SYSTEMS & PERIPHERALS

n is not easy, Evans

Implementation in not easy. Press and its fine facts between resistance from MS staff and end users. "The MS and the fact of the control of the control of the facts of the control of the control of the control ing from IRI file Wang," be explained for the control of the control of the control of the part from IRI from Novel 1 for the Control of the Integration of the Control of the Control of the Integration of the Control of the Control of the Integration of the Integ

# Slide seen in fixed disk mart

From page 33

tos-based Disk/Trend, Inc.
James N. Porter, president of
Disk/Trend, said the simple explana-tion of lower growth rates is lat-year's overall flat performance of the year a overain his performance or the computer industry and the fact that the annual growth percentage is com-puted from a larger revenue base ev-

ery year. But of But other factors contributing to 1985's slowed growth for rigid disk drives will continue to affect the industry in coming years.

"The principal pacing factor on
the growth of rigid disk drives is
software that's late, not ready or

doesn't do what people want," Porter said. For example, as software be-comes more complicated, he said, it st increasingly work with other software or be multiuser, which reilts in longer development times. Disk drives themselves are not

Disk drives themselves are not part of the problem, according to Po-ter. Manufacturers are ready and waiting. Delivery of multiuser Intel Corp. 80296 and 80396 chips would be a tremendous boost to disk sales. but "the industry needs to wait for IBM to set the standards for the multiuser 286 and 386," he added.

The study breaks down the mar-ket, with individual revenue and unit shipment projections for rigid disk drives in nine separate product

oups. Highlights from the report inc

the following:

• Drives with removable disks, once dominant in the industry, provided only 6.8% of worldwide rigid disk drive revenues in 1985. That number will fall to 1.6% in 1989, with

number will fall to 1.6% in 1989, with fixed disk drives providing the rest. • Fixed disk drives in the 50M-byte to 100M-byte range continue to be the fastest growing segment. Worldwide shipments are forecasted to reach 1.79 million units in 1986, pp. 117.85 worl 1985. Of those, 94.7% are 54-in. models, but strong growth more beginning, it expected for 374-in.

 Shipments of drives of less than 30M bytes were 3.29 million units in 1985 and are expected to increase to 9.46 million in 1989 with major changes in the product mix. While 9.46 million in 1989 with major changes in the product mix. While 54-in. drives accounted for 88% of total shipments in 1985, in 1989 they will be almost totally replaced by 34-in. drives, which are predicted to account for 91% of the total shipments. in this segment.

 IBM's actions are expected to drive the market for 3¼-in. disk drives of less than 30M bytes. IBM drives of less than 30M bytes. IBM began to manufacture the 34-in. drives during 1986, and the report forecasts 1987 IBM shipments of 730,000 of the smaller drives.

• More than 50% of all rigid disk drives revenues are despected by

 More than 50% of all rigid disk drive revenues are generated by drives with capacities of more than 500M bytes, primarily from IBM and other producers of captive drives for use with mainframes. IBM's revenue in this sector is forecast at \$5.37 bil-lion in 1987, up only 3% from 1986.
 The study cities stagnant mainframe growth as the reason.

· in the international arena, the long-term prediction is for U.S. manufacturers to lose market share, but the rise of the Japanese yen against the dollar during the past year has given U.S. drive manufacturers a short-term lift. The U.S. share of worldwide shipments of OEM drives is expected to rise from 66.7% in 1985 to 69.4% this year.

Trend predictions

For 1987, Porter predicts the following trends and events.

«IEBM will provide accound midille enhancement for the 3390 disk
drive product linic shipped in 1989, and 1989, a

A large increase in shipments of 34-in. Winchester drives.

Major shipments of high-end (more than 30M-byte) 34-in. drives.

used by IBM Personal Computer AT clone manufacturers to reduce sys-tem footprints. IBM may follow suit later in the year.

 A new type of very fast disk drive that will be used in local-area network (LAN) servers. These high network (LAN) servers. These high-capacity 54-in, drives in the 100M-byte to 300M-byte range will reduce access time from 30 msec to 16 msec. The result will be a dramatic perfor-mance increase for high-end LAN file servers, allowing more users to be

supported.

Porter said there are five basic categories of rigid, or fixed, magnetic disk drives, including:

- 30M bytes to 100M bytes — used in high-end PCs, in LANs as servers

• 300M bytes to 500M bytes used primarily in minicomputers and some specialized systems.

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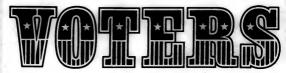
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PROGRAMS IN USE IN THE U.S.\* SyncSort 72%

But proud as we are of this sohierement, we're puzzled, too. How come 28% of you are still procrast nating about SyncSort? You use the best hardwere, and sooner or later you're going to want the best sort program to make that hardwere work even better.

If you'll call, we'll prove to you that all three versions of SyncSort—OS, DOS and CMS—are clearly superior in the three critical areas of sorting:

PERFORMANCE. Sorts have a built-in "Temmany Hall factor." If they run inefficiently, they can ambezzle a great deal of your computer resources and corrupt your entire system's

SyncSort prevents this by keeping sorts honest. Because of the technological breakthroughs we pioneered—many of which are now patented—all three versions of SyncSort scrupulously conserve computer resources. Just how well our policies are working for you can be seen by the chart at lower left.

2. PRODUCTIVITY. There's more to sorting than sorting. SyncSort is loaded with sophisticated features that make it easy to perform other important data-processing functions. Using these features, the time required for simple applications can often be reduced from several hours to mere minutes. Another reason why SyncSort has always carried the programmer votal.

 SERVICE. We never forget who elected us to office. When you need sorting help, our Technical Service people will provide fast, accurate, courteous sorting advice. More than 85% of all customer inquiries are resolved within 24 hours.

To the 72% who cast their ballots for SyncSort, our warm thanks. And to the 28% who didn't, better call us today. Why postpone the inevitable?

"According to IDC's 1995 Survey of Sort Products used with MVS and MVS/XA.

# Curing backlog with relational

hroughout every systems devel-opment group goes the cry for new fourth- and fifth-generation are tools to help reduce the ever-ng applications backlog. At the ine, corporate management at all complains about the lack of re-

tilms, corpos as a complaint about the lack of re-niveness by the data processing p and the fact that many of those p and the fact that many of those the second of the s

# Computer Associates exec plans to keep company on fast track

SOFTWARE NOTES

Business Software

acquires Condor



# APICS is forum for manufacturing tool

debuts from Cullinet

sy Rosemary Hamilton ST. LOUIS — Software packages for turing applications from Calline

# Prudential pur-

ises supplier o systems/44

Motorola demon strates Unixbased operating system for 68020 family /45

### NEW THIS WEEK

- Thom EMI up grades its FCS decision sup-

# INSTANT ANALYSIS

"The focus of development is clearly on MVS/ XA. It will continue to be the flagship of the fleet for large-scale production

# Candle widens features on Omegamon CICS-user package

ed to b

check Omegazion, "In stall, "Our products originally were de-signed for the super CIGS expert," and Par Pare, marching consultant at Cardin, "But CIGS in beginning to age of these popules now." Impact profiles provides the user with a graphic display of the efficie that work lands are having on CIGS, marchine, Cardin produces not consultant to the consultant of the properties of CIGS in the compensation with CIGS in fully competitive with CIMS . The profile of the CIGS in dark STA, CIGS and SSA, CIGS. The profile for any cancers in \$25,000 and the CIGS of their competitive with CIMS and the CIGS of their competitive with CIMS and profile for any cancers in \$25,000 and profile for any cancers a



# If your System 38/36 software can't integrate this many business functions, shift to BPCS.

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# **Prudential** buys Tesseract

lebeek
al Insurance Co. of Amerihased a small, San Fransupplier of human restems and plans to
r market its products in

the US.
Transcract Corp., whose systems are in use at General Motor Corp., TRW, Pirestone Tire & Rubber and Goodysea Tire and Rubber Co., has been noted for eight years as a vensource systems to major corporations. Be suite of integrated products over personnel, payroll, benefits and claims, but President Charles J. Tanti acknowledges, "We have never adult them well."

Furthermore, the 80-employ sesseract, unlike most software or saises, was dependent on its clim or much of its development mon

pasies, was dependent on its cliente A, prop. of customers would not A, prop. of customers would not appeared to the property of the property

acquisition.
Tesseract's revenue in 1965 was 44 million. They are projected to grow to 87 million in 1966 and 815 million to 816 million for 1967, when the first effects of the Prudential activities will be felt, according to Ya-

# Expert systems may change red tape to magnetic tape

tems for use by one reationsa reasonable service.
"Today, the main topic of discussion is not if expert systems may be applied within government and industry, but how and when they may be best utilized," said conference organisers Kamzan Paraney, president of Intelligenceware, Inc., and Barry G. Silverman, director of the Al institute at George Washington University

A clear-cut government application of expert systems is the process and of welfare or medical claims and of welfare or medical claims which are handled by computer systems and require rule-based decions, according to AI scientifica.

J. Water Vera, a researcher at M. J. Water Vera, a researcher at M. P. Water Vera, and a research at M. Water Vera, and a research at M.

He said the expert system could be said the expert system could be say to maintain when religible to changes the rules.

"The policies and regulation relies which over the resolution process may be contained in a knowledge bare in a seasily understood forms, are in that the typically obscure code of

recodural language.
This allows maintenance to be pertrued by individuals with an inspept knowledge of the policies anespitations, rather than by a proransance without such knowledge.
'era reported.

Besearchers at the conference decribed a variety of other governeneri-related applications:

"The U.S. Nuclear Begulatory

o The U.S. Nuclear Regulatory Commission (MICE) is supporting de-velopment of an expert system to help its emergency response team as-alyze critical data during a nuclear power plant methodown. "The very complexity of determin-ing successful strategies for server accidents requires consideration of expert systems," said James P. Jen-kins, program manager for accident management at the NRC's Office of

One or two problems in a po-int triggers about 500 alarms, ac-ding to Dan Corsberg of the Idaho tional Engineering Laboratory, • The U.S. Postal Service sp

• 110 U.S. Postal Service sponsored research on a document analysis system that can locate the destination address block on envelopes, something that its optical character resders have trouble doing. The expert system had a success rate of 85%, compared with 85% for the op-

# Motorola offers Unix version

By Eddy Buildings
NEW YORK — Motorvila Computer
NEW YORK — Motorvila Computer
NEW YORK — Motorvila Computer
New Yorks — Motorvila Computer
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New York
New York — Motorvila New York

implementor for the mysons. The allows transparent file access across different Unix systems. The system was produced to com-ply closely with AT&T's Unix V.3, said Dale Ouimette, manager for sys-

generic basic version will be offered to the company's MC58020 chip and board customers via source licensing. The enhanced version will be avail-

ola's commitment to support its cu tomer base, Ouimette emphasized to



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# Watch what happens next time you ask a mainframe software vendor for a complete customer list.



You may get a convincing song and dance, but underneath it's a different story. Behind those pat answers that software vendor is actually sweating and squirming.

swesting and spainting.
Why don'the year toy to lose a complete list? Simple. They know that their size and name militarily do not guarantee happiness. Many well-application produced line: They know that their substances is many contains a good number workers have, at best, uneven quality across a multi-application produced line: They know that their customer list many contains good number of loses than-thopy closes. It's difficult for these vendoes to commit the human and monetary workers to commit the human and monetary product a resultable forther. It'd difficult for these vendoes to commit the human and monetary product a resultable from a firm that a registralistic is a single application area. A firm like that Design everyon mandrame financial.

Data Design develops mainframe financial applications software. Period. We understand all our users' repriments and are therefore able to provide the necessary support: over 40 percent of our support and installation staff are CPAs or have MBA's.

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oustomers a complete oustomer list. That is becaus hundreds of FOCHUNE 1000 companies have resped exceptional results from our financial software systems. Aloxa, Gerber, Pillsbury, Sherwin-Williams, Merrill Lynch, Bankers' Trust, Bristol-

Myess, Rederal Bayess, Litton, Lloyd's Bank, The New York These Company, Owen Corriag, Royal Business Machines, Warner Lumbert and Issuarhest Some have opted for Bask Design over other major vendors. Write for our complete customer list and site approach in Bloot our fast, trobble Fee implementation; system floathility and case of use; in depth training and responsive, trouvise/pashle support, management lared people in customer service positions, and more.

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### CAI exec plans for fast track

on tops - sizes, fac. and further committed li-di to the micro market in 1994 has it acquired Sortic Gory, Means in acquired Sortic Gory, Means or Arkey Comparts, inc. in 1994 and hase Software, Inc. in 1994 and has Software in 1994 and has been supported by the software in 1994 the Inc. in

runnty use the United States." The following interview was con-cted by Charles Babcock, Compu-world's senior editor for software. GW: You reported revenue of \$191. Ilion for fiscal 1996, which ended such 31 How does 102.

eshang up. How does 1967 appear to eshaping up? MMARE: Wall Street analysts proct something like \$255 million. Own Callinet Software, Inc. Just re-preted a losing quarter. Do you exit to reach \$255 million? MARMS. 1-1-1-1

pect to reach \$256 million?

WANG: I think it's realistic. We always project a growth of 30% to 35%. It's actually higher. We just reported account-quarter revenue of \$63.5 million, up 51% from the year before. Net income was up 105%.

CM: What's monitor. CW: What's moving for you?

disk management system.

CW: IBM just reported a slack ing in the growth of its internation sales. How have they fared for you want to have a very strong for the strength operation. For WAME We have a very stared for you?

The property of the prope

ing applications face tough competi-tion from MSA, McCormack & Dodge Corp. and others?

MSAME: Our products work from MVS right down to VSE. Where we're having more success is probably in the VSE market.

GW: What's moving in the MVS

want. In the systems area, the hole product line: production man-ement, resource management, job

CW: Let's consider IBM. IBM has

stching one utility after another.

WEMME: I don't think IBM really stches software. I think they take orders for software. I don't think this orders for software. I don't think this is something that's new. I mean, IBM is a hardware company. They give you 10 more million instructions per second. Then they give you a new operating system that uses 11, so where are you? You've got to get another new machine savery.

are you? You've got to get abouter new machine anyway.

CW: Do you see them being more active in your line of business?

WANNE: We've seen a lot of them even in the past from a couple of van-tage points. But our strategy is to add value to IBM base products.

CW: You have entered the data base management system market with CA-Universe, but I don't know Computer Associates as a data base

Consistence system vendor

WARRE. It's a good engine plus
great tools. If somebody wants to use
great tools. If somebody wants to use
great tools. We not tools. We have an installed base of about 250.

CW: Is CA-Universe actually a
compatible system with Dik2?

WARRE. No, not tools, That is the
goal. I don't know what the exact devolopment schedule.

for you? WANG: The micro area has not met

cw: expectations. It is breaking even.

CW: What is the problem there? A
reat deal of competing products?

WANG: Everybody has written

MANNE. Everybody has written betrown by now. In micro software hardware line to the thing that has been excited in the past is the whole sector of service and support. People seed. Tm spending \$400 to \$600 on a reduct. You know it's a cheap prod-ct, as people say. And therefore the emotion is relactant to provide suit-to provide support. But that is how we have build oyal following on the mainframe ide with support.

soyal rotowing on the maintrans side, with support. GW. You are trying to build your micro customer base, a process that is not necessarily highly profitable? MSME: There has t a lot of revenus for that. As a whole, the micro division does make a nominal profit. The second quarter was quite a bit better. GW. Are you still sequiring micro

roducts?

WANG: We look to see what we can
twerage off whatever investment we
ave made. . . . We have plenty to do
ght now with Supercale 4, Super
roject and Easy Business.

CW: Who makes decisions on ac-

quisitions?

WANGE, it's a team effort, though I do have the veto power. It's sort of a group effort to look at a company. Since we have a good distribution force, we will look at how we can best leverage off our product base. We want to make two plus two equal control of the control of the





MTI SYSTEMS CORE

MicroNAX is a productoral of Deptal Equipment Corp.

### SOFTWARE & SERVICES

# Software out at APICS

From page 43

iary, and the IBM package will be marketed by Cullinet. The VAX package is currently available to run under the Pick operating system from Pick Systems, or on the Honeywell, inc. DPS-6. The IBM package, currently in beta test, is acheduled for shipment in early 1987.

shipment in early 1987.

Along with the software announcements, Cullinet said it had beefed up its consulting services for manfacturing

customers.

The Cultinet Manufacturing System-Repetitive is an extension of Cultinet's existing manufacturing software and will continue to be sold to discrete manufacturers or those that develop products

on a made-to-order basis.
Cullinet used CSI's repetitive
manufacturing expertise to
extend the mainframe manufacturing system's functionality, according to Tom
McDoniel, director of commercial products.
CSI, which McDoniel said

CSI, which McDoniel said had "just about cornered the market in repetitive manufacturing," worked with Cullinet to "extend our applications." He added, "CSI had just started to move into the IBM marketplace, and that's one of the things that brought us together."

Both products are made up of eight modules for the manufacturing process, including bill of materials, inventory and shop floor control. The repetitive package will sell for the same price as the existing product, scoording to

# Notes: Oracle, Wang sign up

om page 43

tional Technology, Inc.'s personal computer-based version of the relational data base management system. A 1987 debut is planned.

Oracle Corp. has signed an agreement to port its products to the Wang Laboratories, Inc. VS series of minicomputers and the Wang debiton intercomputers.

Seventy-four percent of the insurers in a survey conducted by Pallin, line, said cuted by Tallin, line, said cuted by Tallin, line, said from independent suppliers rather than developing all their systems in-house. A year ago, the figure was 69%, according to the Indianapolis supplier of software to the insurance industry. Client package were among those most, in demand, apokesmen said.

the vendor. Starting at 1 470,000, the combined package can cost 4560,000 if all modules are purchased. Those current users on maintenance contracts can upgrade as part of their annual

software renewal fee, Cullinet said.

The VAX repetitive manufacturing software, which ranges in price from \$100,000 to \$180,000, is similar in principle to the IBM package. It consists of six application modules for the nanufacturing process.

The following products were also announced at the

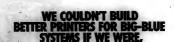
APICS conference:

• Western Data: Systems
said its manufacturing manufa

defense contractors and financial and contract management in a manufacturing environment. It includes applications for cost account-

virolament. It inclusion applications for cost accounting, quality control and government reporting. The package has a base price of the cost of the c

maker of the Nonstop computers for on-line transaction processing, said it teamed up with Thomas-Laguban & Associates inc. (TLA), which sells the internal factory terms of the agreement, TLA will sell its noftware, used for shop-floor planning and control, to Nonstop users in factory environments. The software is customized for TLA designed data base for manufacturing-related data.



W

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# COMMUNICATIONS



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could not even be given away in the early 1980s. The U.S. Postal Service's

Ulrich is a partner with Coopers & Lybrand and manages the Walter Ul-rich Consulting subsidiary in Housto

# Datapoint powers up LAN

Adds power, connectivity to gain market position

By Alan Alper SAN ANTONIO — Attempting to engthen its position in the departmental nputing arena, Datapoint Corp. recently relied enhancements that add power I multivendor connectivity to its Arc lo-

unveiled enhancements that add power and multivendor connectivity to its Arc lo-cal-area network (LAN) system. Datapoint's latest additions to its Arc line of network servers incorporate the in-tel Corp. 80286 microprocessor, with a fu-

tel Cop., 80286 microprocessor, with a fu-ture migration path to the more powerful 80386 microprocessor, the company said. The Starship II host system can be config-ured with two to four tightly coupled 80286-based processors that share access to memory, I/O channels, controllers and other devices over a 32-bit internal bus. It

# Data equipment grabs larger slice of budget pie

By Elisabeth Horwitt ELLICOTT CITY, Md. — A 132-compay survey recently completed by Newton-vans Research Co. found that data comnunications managers expected to spend a average of \$1.472 million each on data communications equipment next year. This represents a 44% cumulative growth rate since 1984, when the average data communications budget was \$1.019 mil-

Consumers.

Bedget plans for 1997 call for an everage 11.1% increase over 1986 levels, while
the average budget increase from 1995 to
1986 was only 7.3%, the report noted.
On the average, respondents told Newton-Dvans they plan to allocate half of
their 1987 bedgets to data transmission
equipment, about 30% to data concentrayears of the concentration of the

supports between 40 and 150 users, operates at 2.2 million instructions per second and delivers throughput of 2.616M byte/sec., Datapoint said.

Second Seco

RMS/XA supports multiple operating systems such as Unix, Digital Equipment Corp.'s VMS and Microsoft Corp.'s MS-DOS and is compatible with existing RMS im-plementations, allowing the Starship II to become another resource-sharing unit, along with other Datapoint processors, on apoint's Arcnet LAN. Datapoint work-See DATAPORT page 59

# Communications budget allocation ore money to n



### INSIDE

Carcel brings voice/data multi plexing technology to market/54 Hewlett-Packard enhances its protocol analyzer family/55

## **NEW THIS**

A 19.2K bit/ sec, connection between Apple's Macintosh and Northern Telecom's Meridian SL1 PBX

is announced other new prod pp. 115-143.

### INSTANT ANALYSIS

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as a product man-

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### MONROE DID.

The ability to leverage production with truly efficient decision support is what put Monroe Auto Equipment on the road to Cullinet's IDMS/R. Manufac turing Applications and Information Center Management System. The world's leading manufacturer of automotive ride control systems, includi popular Monroe shock absorbers, and struts, they were impressed with Culliner's broad product offering. Their objective: reduce inventory, cut scrap, and improve labor efficiency. Cullinet software will help them meet those objectives. Cullinet's technological superiority will allow Monroe to improve planning of its manufacts operations (manpower, machines an materials) while it helps generate a production schedule that more closel corresponds to its customers' requir ments. The Cullinet solution will make business run more smoothly at Monroe.



### COSMO OIL DID.

There of companies recept or coase: Carmo Ol-Inpair that largest supplier of peroleum products. That also carmo Ol-Inpair that largest supplier of peroleum products. That also carmo of the carmo of th





### PIC & PAY DID.

The largest self-select shoe chain in the The largest self-select shoe chain in the Southeast, Fix Play is growing by more than 80 stores a year – a rate that requires some pretty fancy information system footwork. Fast and simple development of new applications software is a must, Pic 'N Pay discovered that Culliner's vensulie end-user took were the answer. IDMSR with ADS Online has allowed them to realize Online has allowed them to realize major long erms savings in maintenance time, while maintenance costs have been out in half it's a powerful solution that Pic 'N Pay uses to process up to 300,000 both the massactions nightly. Similarly helpful in getting, the right shoes to the right store at the right time are multiple copies of Colliner's motor-omain-frame link, INNOCATE. Now Pic 'N Pay has an extracted a contract of the recovered contracts of th integrated system that's setting them off on the right foot for future growth.

### PILLSBURY DID.

to process transactions for each line, and they needed to build a base of inand they necess to dust a case or in-formation to respond to demanding support requirements from grocery wholesalers and retailers. The solution was prototyping – available only through Gulliner's IDMSR with inno-vative ADS/Onl.ine and ADS/Batch applications development tools. With ADS/OnLine, Pillsbury found that developing prototypes of interactive systems increased productivity and deviciping procusping to a support of the support o

### ACCESS CULLINET.

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# Cullinet

Information Technology Integ For the 80s, 90s And Beyond

# Carcel launches telecom voice/data multiplexing technology

### 'ISDN forerunner' sold to operating companies

By Stanbuy Sthem
SARATOGA, Calif. — A digitized
voice and data multiplexing technology purported to be a forerunner of
the emerging lanegrated Services Digstal Network (EDN) standard is now
being marketed to divested Bell operstraing companies by Carcel Telecommunications, Inc.

inications, Inc.
Jointly developed by Carcel Presint Gregg Carse and Pacific Bell, the
chnology enables ordinary teleone lines to support multiple voice
d data channels handling aggre-

gale raise of up to 80% bit/sec. over local-loop distances of up to 18,000. The control of the c

phone line."
The Victoria technology will enable regional curriers to deliver SDM functionality long before SDM in Americans, and the second control of the control of the

this year.

Bowever, regulatory hurdes encountered by Pucific Bell may delay
the time when Victoria's coto-performance salvantages become available
condigs to Michael Ecuterod, the
conspany's executive director of new
terror's applications.

period of the Company is accounted to the
superior and the Victoria
system as a user gateway to lis X.25
packet ewitching network.

Federal Committee Countries

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Th

Federal Communications Commis-sion regulations dictate that Pacific Bell's competitors are entitled to use the Victoria system as a gateway to their own packet-switching services at the same prices paid by Pacific Bell. The company is filing a proposal to meet those conditions, it said.

Another area of concern is whether the black box that interfaces the customer's data and voice equipment to a local telephone line should be classified as a multiplexer or as customer premises equipment for regula-

tomer premises equipment for regula-tory purposes.

If classed as customer premises equipment, its patented design would have to be disclosed. If considered a multiplexer, the equipment would be exempt from disclosure, according to Second Computer Inquiry regula-

tions.

The FCC is still debating this point, Eastwood said. He added that even if the FCC decides the black box is customer premises equipment, and Practife Bell is forced to reveal the box's design to competitors, the company will still continue with the Victoria program, though it will is likely to change its sartiff proposal.

# PCs get link with TCP/IP

By Elsesbeth Howelt
Ungermann-Bass, inc. recently an
nonuced TCP-PC, a hardware and
software product that enables IBM
order product that enables IBM
order a localization activent (LAD) using Transmission Control Protocol,
internet Protocol (TCP/IP). The
product is the first of a series of
paramed offering that implement the
dard on Ungermann-Bass's Net/One

LAM.

"B has become increasingly clear in the last aims months that our countries in the last aims months that our can be comediated to the last aims months that the last aims months of the last aims are consecutively." asked the retanament of the last that the last prefetch that its beer now." TOP, IF is not perfect, but its beer now." TOP, IF is not perfect, but its beer now." TOP, IF is not perfect, but its beer now." TOP, IF is not perfect, but its beer now." To the last perfect that the last perfect has been considered in the last perfect that the last perfect

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Detatyon and TroLynx are trade Dataper Streearch Corporation.

### COMMUNICATIONS

# HP adds to protocol analyzer line

By Joffny Booler
PALO ALTO, Calif. — HewlettPackard Co. has enhanced its network management capabilities with
wide-ranging hardware and software
additions to its family of protocol an-

included in the recent announcement are the Model 4862A protocol analyzer, a portable troubleshooting device that operates at 64K bit/sec., and the 18212A, a performance analysis program for HP's existing 4971A

local network analyzer.

He also unveiled three software enhancements that allow the 4963A protocol analyzer, an existing product, to support IBM's Systems Network Architecture (SNA).

lyser's product manager.

In addition to supporting transmissions as high as 64K bit, sec., the unit comes with an optional 750kbyte buffer memory and can decode SNA data flowing through a CCITT X.26 packet switching network,

X.25 packet switching menower, Bechter said.

The 4952A box is small enough to fit under an airphase seat. Portability is among the device's chief selling points, according to Bob Bauman, a quality assurance and product tesing specialist for Inforron Systems

Corp., a large user of HP protocol as alyzers.

alysers.

Bauman described the 4952A as primarily a field service tool rather than a replacement for the "\$20,000 scopes that users already have in their laboratories." With it, he said, "a field engineer can travel to a remote site and figure out where a machini like."

protein use.

If the control of the

work and see what nodes are generating traffic or errors."

Rounding out HP's introduction were three software packages that add SNA support to the 4963A protocol analyzer. These include the 18310A SNA emulation language, the 18311A SNA 3270 device exerciser and the 18312A SNA LIO£2 node ex-

The software tools also enable users to "twiddle with commands, do boundary-level tests and see where a network fails," Pour said. Prices for the three software packages range from \$1,000 for the 4962A and \$2,000 for the 18312A.

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cy are. Wherethey are. And what they say about you.

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### COMMUNICATIONS

# Data equipment gets bigger budget

tion equipment and the remaining 20% to network management control equipment. Compared with 1985, rendents appeared to be spending a uler percentage of their budgets on transmission products and more on the other two types of equipment, the report stated (see chart page 51).

ending companies experient installed units of private-by 119% increase installed units of private-line 56K bit/sec. modems by 119% from 1985 to 1987. The report also predicted use of radio frequency mins and 14.4K bit/sec. modems

ould grow significantly during the me period.

Private packet-switching equip-ment is in use at 13% of surveyed firms with more than 5,000 employees and data communications expen-ditures exceeding \$1 million per

year, according to the report. Twenty-six percent of all respon-nts were using T1 equipment by agust of this year, and another 7% August of this year, and amount anticipate using T1 equipment by 1987. T1 equipment was installed in 50% of the firms with annual data communications budgets of \$1 mil-

On a per-unit basis, port selectors are expected to experience a 78% growth during 1996 and 1987, New-ton-Evans said. The multiplexer inilled base is expected to grow 53% er the 1985 to 1987 period.

# PCs get link with TCP/IP

es designed to interface with Nethios can communicate across a Net/One LAN using TCP/IP proto

cols. Ungermann-Bass and Excelan, inc., in conjunction with several oth-er network vendors, are working on a TCP/Pt-Onebios standard inter-face so that their respective products

rate its current and future TCP/IP products to Open Systems Interco nect protocols as they emerge, Bu stein said. Conversion will be a ma of loading new software onto the

er or touching new sortware onto the ardware board, he said. Net/One TCP-PC consists of a oard-level Network Interface Unit or an IBM PC or PC AT, plus soft-rare that fully conforms with TCP/

protocols. Net/One TCP-PC is available im

mediately, priced at approximately \$950 for quantities of 50 or more, An ne Service is available as a site op





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12 cyl. PDS Copy				
lebcopy	9 min. 14 sec.	1 min. 20 sec,	10,792	\$18.47
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# Datapoint adds power to LAN

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includes two 80286 microprocessors, 4M bytes of main memory, an 1/0 channel host adaptor and a dual Arc networking module, is \$79,000. Availability is within 90 days, the

Availability in within 80 days, the Delapolitis tax nurvised Starzbate, the new version of its Mine video technics, the new version of its Mine video workstation. The 800000-based system supports up to 48 bytes of memporis on the 10 days of the proports of the 10 days of the

can also run Datapoint'i line of office sutomati providing word process ic mail, spreadsheets and The diskless workstatio

orkstation can also ac-ns from a hard disk of the unadess wantabase use make come applications from a hard disk of an 185-100 workstation on the network, the firm said. The workstation is priced at \$3,000 and is available within 90 days, the firm said within 90 days, the firm said of the planning to unveil support of IBM's Distributed Office Support System and to interface from Support of IBM's Distributed Office Support System and to interface

of 18M's Distributed un-fice Support System and to interface with the 1BM Token-Ring network, although the firm declined to provide a schedule.

a noncoust.

Datapoint also brought out a new disk subsystem for Starship II, rovoiding between 66M bytes and 
1,0866 bytes of memory. Up to 64 devices can be attached to Starship II 
providing up to 17-46 bytes of online disk storage, the firm said- Prices 
for the subsystem range from 
119,500 for 274M bytes to 449,500

18,000 for 27444 types to \$40,000 for 10 byte.

The firm also unveiled at \$4 in tage.

The \$2,000 and will be 10.000 for \$2,000 for \$2

taro. "With these new products, we're restoring Datapoint as an attack com-pany rather than one working within its own base," he added.

# Unproductive?



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resume and salary history to: Bill O'Keele, P.O. Box 492. Milwaukee, WI 53201. SUNDSTRA

# Class costly for Zapmail

congressional anger and consterna-tion. The following factors were par-tially responsible:

• Poor-quality documents with poor-resolution images that were un-acceptable for business use.

• Inconvenient locations for drop-

ber of sec-

lited market awareness. Pederal Express purposely provided a feature-rich serviced designed to avoid all of the above problems. Bligh-resolution graphics would be printed on bond pager. Both pides and delivery would be provided. More than 100 locations would be served initially. The company's marketing department developed a promotional campaign that included latevision commercials.

where it tacked the know-how, cul-ture and focus to succeed.

In the face of hundreds of millions of dollars in loanes, Smith announced Sept. 29 the cancellation of Zapmail. It was surely a bitter pill to the great innovator. Pederal Express is sure to

rsue other electron not not camer electronic communica-tions opportunities in the future, since it offers great profit potential, and the company's long-term succes requires that it still view laself as a communications. ic com

communications — n. your counter — company.

The absence of Federal Express will create a vacuum that a few companies might fill. A prime candidate in DHL Worldwide Express, the larg-

DHL is a leader in delivering docu-ments and small parcels to remote corners of the globe. The company already delivers electronically gen-ated documents and is technologics by positioned to address the Zapma

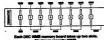
J possession for the process of the process of the possession of t

Over the longer term, facsimile will become just one of many meth-ods used to generate and deliver docode used to generate and deliver of uments. Savvy companies are al-ready exploring the potential of mixing facsimile, text-based elec-tronic mail, voice mail and other technologies in their efforts to ad dress users' changing and growin communications needs.

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Our IdMB supermemory design takes half the space of DEC add memory bonds, for or of the log differences between IdMV and we looked supermemory and DEC, had the memory is obvious a a glance. DEC also uses older 1568 RAM technology and unforce mounted devices with nearly five times as many bond constitutes as on our are supermemory. As a ment, DEC bond takes up two slots while our bond coxpetitutes up two slots while our bond coxpetitutes are on our are supermemory. As a ment, DEC bond takes up two slots while our bond coxpetitutes are on our area.

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# MICROCOMPUTERS



# NEC PC put through paces

espite the tremendous success of companies like Nikon, Ivc. and Canon, Inc. in cameras, Nissan Motor Co. and Honda Motor Co. in automobiles and Sony Corp. and Panasonic Co. in stereos and televisions in the U.S. has had comparable success in selling desktop personal computers in the U.S. NEC Corp.'s Intel Corp. 80286-based APC IV may be the system that changes

Compatible with the IBM Personal Computer AT and offering a switch selection on the front of the box for 6or 8-MHz operation, the APC IV is a or 6-MHz operation, the APC IV is a well-engineered system offering an at-tractive alternative for users. Although it is not the most aggresslevely priored system around, it is almost certainly one of the best built, and has the same solid look and feel one associates with Hewlett-Packard Co., Texas Instru-ments. Inc. and Compan Computer

A highly compatible full-function system, the APC IV comes standard with 640K bytes of random-access memory, a clock/calendar, a controller memory, a clock/calendar, a consecution of that will support up to two each of floppy and hard disks, two 85-232 parallel ports and a serial port built in. There are five half-height peripheral clots and eight expansion slots. Two of slots and eight expansion slots. Two the latter are 8-bit data bus Personal ater XT slots; the other six are 16bit AT slots. Microsoft Corp. MS-DOS 3.1 and GW-Basic also come standard in

all configurations.

Zachmann is vice-president of re-search at International Data Corp.

# Chips up board efficiency

### Firm claims kit boosts system power, cuts space

By David Bright
MILPITAS, Calif. — Hoping to speed th MILITAR Calif. — Roping to speed the evelopment of more powerful personal development of more powerful personal revelopment of more powerful personal revelopment of the company of the personal computer XI company of the personal Controller Chip. vendors can reportedly space, consumes one-third the power and produces more than twice the performance space, consumes one-third the power and produces more than twice the performance of the personal control of the person of the personal control of the personal control of the person of the personal control of the person of the pers

kander Naqvi says systems using the new chip set will start in price at \$4,000. In comparison, Compaq Computer Corp.'s Deskpto 386 starts at \$6,499. Chips and Technologies President Gor-don Campbell stressed that systems built

Programs offer

By Peggy Watt PORTLAND, Ore: — Airus Corp. re

the operating system and word pro

that stop screen input If Illegal con are entered, the firm claimed.

as the key strength of its tools.

ogy, which the company also licenses as an OEM product. With Airus-A, a user can build customized shortcuts for data entry

instant feedback

# with the chip set would maintain compati-bility with IBM Personal Computer, Per-

sonal Computer XT and AT software." AT/386 Chipset provides systems manufacturers with an integrated, cost-effective solution for implementing such high-performance, AT-compatible 32-bit computer systems," he said. sbined with a 16-MHz 80386 mic " he said.

or, the company is targeting the cis at two areas: office at ristations and extremely high-perfor-nce workstations. Optimized for such manding applications as computer-aided ign and engineering, industrial automation and transaction processing, the more powerful systems incorporating the AT/ 386 Chipset will generally be outfitted with large disk drives, large amounts of

with large disk drives, large amounts of random-access memory and extra graphics processing capabilities, Naqvi said. Some 40 vendors are currently using Chips and Technologies 80288-related chip set, according to Naqvi. Among hove vendors are Tandy Corp., ITT, NEC Infor-vendors are transported. on Systems, Inc., mail order house See CHPS page 65

# Software to run Unix, MS-DOS on 80386 concurrently

ly announced two implementations of its "intuitive" communications system, an ap-proach designed to simplify commands to By Eddy Goldberg
NEW YORK — Locus Computing Corp.
of Santa Monica, Calif., demonstrated an
alpha release of its Merge 386 software plications. Both Write Now, a word processing proproduct, which runs Unix and Microsoft Corp.'s MS-DOS co-resident on an Intel gram, and Detente, an accessory to Micro-soft Corp. MS-DOS, use Airus-A technol-

Corp. 80386 processor, at the recent Unix Expo show here. When completed, Merge 386 will simul-taneously and transparently execute both Unix and MS-DOS operating systems, al-lowing several Unix and MS-DOS programs to be executed concurrently. If successful, it will likely be the first product to support multiple MS-DOS tasks. A beta version of Merge 386 is expected to be ready by

### INSIDE

Presentation Technologies offers optical-based slide maker/63

Datavue an nounces PC-compatible laptop/64 Portables help cut nutrition program

Phoenix Software package manag disk drives / 66

### **NEW THIS** WEEK

 Cyma/McGraw-Hill offers Cyma Professional Accounting soft-

ware series other new products, see ep. 115-143.

# INSTANT

ANALYSIS "The cost per millions of instructions per second

of the Intel Corp. 80386 system is better than the cost per MIP of the largest, most powerful mainframe today.

presid

- Jon S

# Oracle launches ALLIANCE program for software VARs

Oracle Corp., supplier of the ORACLE distributed reli Affinite program. The program offers broader markets, simpler, faster selling cycles, and shorter time-to-market for VARs who build or convert their applications to use Oracle's products.

According to Larry Harman, Oracle's Director of the VAR
program, "We offer major business henefits to VARs who ne to use ORACLE with their products. Chief among these benefits is ORACLE's portability and the portability of ORA-CLE-based applications, allowing applications and data to be shared among different machines. Oracle also provides the link software to exchange database information among the differen

### Broader VAR Markets

ORACLE runs on the widest array of burdware: IBM m frames under MVS and VM, most vendors' minis under both proprietary and UNIX operating systems, and PCs under MS

Harman states, "Only with ORACLE can an application developer produce software on one system and inherit a visit market of users of multiple vendors handware Basically, we let our software VARs do hindfold software.

The company described "blandfold selling" as the ability of a VAR's salesman to walk true an end-user sale blandfolded and say. "I don't know what types of hardware you're using, or hos many types there are, but my applications run on all of them.

Harmon rooms out that VARs have a treath decision to make concerning what hardware to implement on. With ORACLE, that decision needs to be made. Software VARs who establish a mole is a particular wender's matell base can take advantage of ORACLE's portability to sell in other hardware environment

### Shorter Time To Market The company also cited the high level of productivity officeed to VARs by Oracle's broad range of application tools, including a

form system, integrated spreadubers, graphics and other tools. These yield development and maintenance efficiencies that And, Harman adds, "ORACLE is the most complete and mater SQL-based DBMS on the market SQL is becoming a national standard, so developing applications with an IBM compatible, portable DBMS makes because seete in both private-sector and public-sector markets."

non concludes. "Generous discounts plus support, trus ing and co-marketing combine to make the Alliance program an oussanding opportunity for software VARA." ORACLE distributed relational DBMS, 4GL and DSS tools. ORACLE was the first commercial SQL-language DBMS, and is able with IBM's DB2 and SQL/DS DBMSs. ORACLE provides a standard software environment is n side range of computers and operating systems, including IBM

numframes, menicomputers from DEC, DG, ATT, HP, Stratis-IBM, Apollo and many others, and IBM PCs ORACLE name on IBM's MVS and VM-CMS, DEC's VAX-VMS and DG's AOS VS among others, as well as with UNIX on most system All versions of ORACLE, from the maintrane to the Pl information, are identical ORACLE to the just relations DBMS which provides the complete portability of data and applications across a wide variety of systems. Oracle's SQL\*Star hinecture links dissumitar systems running ORACLE Oracle Corporation markets its products worldwide thro denct sales offices. If distributors and the Authorized Oracle Dealer network. In addition, ORACLE is sold by numerous

hardware manufacturers, including IBM. Honeywell, Speen ORACLE\*

Compatibility \* Portability \* Connectability For additional information, contact Larry Harman, Director VAR Marketing, Oracle Corporation, 20 Dayes Devic, Belmon CA 94007 or call 801-345-DBMS

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# Beta users find desktop slide system saves time, money Jose, Calif., said Image Mak-er provides in-house slide production that is sufficient

By Poggy Wett
SUNNYVALE, Calif. — A
microcomputer-based side
maker that imprints Images
directly on film instead of
converting on-screen graphics was announced last week
by Presentation Technol-

ies, Inc. The \$4,995 Image Maker hardware produces standard slides with up to 16 colors and 400 characters using Presentation Technologies' Presentation Technologies' \$295 Image Mate software or any of several of several other pre in graphics progr ing on an IBM Pers

maning on an IBM Personal Computer or compatible system, according to Alan Non-nenberg, vice-president for marketing and sales. Target customers are companies that make frequent presentations needing alides or other overhead projections, those that currently use less sophisticated presentation equipment or those companies that pay an outside service agency to provide service agency to produce the property of th ide service agency to pro-luce the slides.

"We call it desktop slide aking," said Robert Wall, sairman and CEO of Presenairman and coods! "We be-tion Technologies. "We be-ve it will make up a new wrket, a subset of desktop reentations." He also excts the market to grow to \$360 million by 1990.

Early customers and beta-test users say the system pays for itself in short order. "It's the difference between It's the difference between loing a nice presentation in oling a nice presentation in one day or going out and see also good of the one destroyed of the last instance, "asid Carol John-ton, contracts administrator or Arrow Electronics, Inc. in tunnyvale and a beta-test munyvale and a beta-test on useful to relinquish after sees who found the product or present of the contract of the contract of the product on useful to relinquish after seesing. She uses Polarodi orp, a Polachrome film for netant development.

"It's not really a good idea to decide to do it an hour be-fore the presentation, but the fore the presentation, but the software is very self-explan-story," Johnston added. "The first time I used the Im-age Maker, I did a presenta-tion of six or seven sides us-sing the free-form design, which is supposed to be the most difficult."

Photographic Lab Process
Techniques in Sunnyvale
found the method saves time
without sacrificing quality,
according to Alan Lee, company president. "I probably
"I for my cost." Lee pany president. "I prob-save 80% of my costs," id, who previously sent his mputer-designed slide im-es to an outside agency st converted them to film.

"It's almost optical quali-ty, and that's not true of any computer-generated ides, as far as being crisp and sharp," Lee said. Presentation Technologies said the output is up to \$,000 lines on a slide. Lee said he looks for-ward to enhancements that allow the immediate merging of photographs with graph-ics and text on a single slide,

in the works.
Ron Brown,

Brown, marketing cations director at hnology, Inc. in San

when you e An outside ag

cs and

sker hard-ed a 35-mm ners using stan-chrome or Polsne film, which is photo-

exposed to sted with overlapis, one with charac-

ing for text on's Wall sa

each second, but users said the production speed varies with the design's complexity. "We're trying to appeal to people who don't use slides now because it's not fast enough," Wall said.



If a critical area of your operat broke down, how would it aff r coinpany? More than likely, sales wo

off, customer service would decrea and you would probably suffer a mai

ont ioss.

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n if crucial data pr

bility were destroyed.
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The right choice.

# Quadram Corp. unpacks an IBM PC-compatible laptop

# 10-lb unit includes

# stand-alone processor

By James A. Mortin NORCROSS, Ga. — Quadram Corp.'s Datavue division recently an-nounced a -10-lb IBM Personal Comer-compatible laptop microcom-er consisting of a self-contained top module that can work in tan-mount a 20M-byte hard disk drive

The Seap 1+1, aimed at govern-ment, corporate and educational mar-kets, is said to separate into two

top based on a CMOS version of a 16-bit 80C88 microprocessor chip. The

bit 80.58 microprocessor chip. The chip supplier for the product, however, has yet to be determined.

The lightop percition features 512K. The lightop percition features 512K. The lightop percition features 512K percition for the lightop percition features 512K percition for the lightop percition features 512K percition for the lightop percition for the light perceived for the light perc

314-in. disk configurations, both with one half-size expansion card slot. Both weigh about 5 lb and can oper-ate on an internal nickel-cadmium

battery for up to eight hours.
Software available for the Microsoft Oorp,'s MS-DOS operating sys-tem can be stored in the lap module's CMOS RAM for use without the ex-

The lap module.

The lap module is "in essence, a diskless microcomputer with great expansion capability," said Sharon expansion capability," said Sharon Cappett, Batavue product manager. "With the expansion module's expan-sion side, you can put in a bisynchronous communications card or net-rorck card and access a mainframe. Together, they offer more options and features in a laptop for less price and weight."

Datavor's latest portable has the potential to appeal to two types of

laptop users — those who need a lim-lied-power machine for word pro-cessing and note-taking and those who require full functionality when making sales calls or working on the road, according to R. Bruce Johnson, a laptop analyst and manager of the PC Resource Center for Delottic Backins & Sella, a New York accounting

"If this can provide a good answer to both, then I think there could be a market for it, despite the glut of lap-tons out there." he added.

tops out there," he added.

The Snap 1+1 and an optional in-ternal 300/1,200 bit/sec. modem will be available in first-quarter 1987. A basic configuration with dual 314-in-disks, 640K dynamic RAM on the expansion module and one expansion slot, costs \$2,095. A hard-disk vercosts \$3,496. The lap module can mon costs \$3,490. The sap module can be purchased separately for \$1,095. In addition to the standard LCD screen, amber-colored gastight and traditional backlit screens will be available, but prices were not an-

Programs offer

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# instant feedback

"Instead of after-the-fact feed-Instead of a spelling checker, you can take advantage of the microcomputer's idle time for instant response to input, "said Barry Obrand, Airus's president.

are activated, the Airus-A will use reverse text to highlight any apparent spelling error as soon as the first misplaced letter is typed and can imme-diately offer a menu box of likely al-ternatives, which change immediately on-screen as a command

At its extreme, the "Clairvoy-ance" and "Spell Guard" commands will complete a user's partially typed entry with a word available in the entry with a word available in the expandable dictionary, said Jay El-seniohr, vice-president of sales and marketing. Peatures can also be pro-grammed to prevent the user from completing entry of "impossible" words not in the program dictionary. Eisenlohr said

Eiseniohr said.

The word processing program
Write Now follows the simple language commands, including pop-upmenus labeled "cholices" and "locate" commands for file searches, Efohr said

revened in a random access memo-ry-resident enhancement to MS-DOS and IBM's PC-DOS. Features include a command stack listing the last 10 commands entered and many of the same editing capabilities as Write

"The user has room to grow" by turning on or off various safeguard keys as needed, Obrand said. "If you keep the users too insulated, they can't learn beyond some point," he

Though Airus products now run only on IBM Personal Computer and compatible systems, Eisenlohr said the company is interested in product development for the Apple Comput-

# Software to run Unix, MS-DOS

year's end, Locus President Gerald

year's end, Locus system inte-proper said.

Merge 386 provides system inte-grators with password security and file protection for MS-DOS users; re-cord-level access to the same files by both operating systems; and the abil-tion in the same files by the same files by both operating systems; and the abil-tion in the same files by the same files by ity to invoke Unix prog within MS-DOS programs.

within MS-DOS programs.
Locus also demonstrated LX-Windows, a graphice-based MS-DOS/Unix windowing system that will run with Merge 386. LX-Windows, based on MIT's X-Windows, is a graphice-based MS-DOS/Unix windowing systems. based MS-DOS/Unix windowing sys-tem that provides overlapping opsque windows and subwindows to arbitrary depth in the Unix System V

evironment. It is expected to be re-used by mid-1967. For example, when used with Merge 386, LX-Windows will allow a user to sort a large Ashton-Tate Dosse III data base in the back-ground, run Lotus Development Corp.'s 1-2-3 in the foreground and

Corp.'s 1-2-3 in the foreground and run one or more Unix programs in other windows without interrupting the Dbase and Lotus programs. Longer term plans at Locus include Microsoft Windows-compatible ex-tensions so that MS-DOS programs enhanced to function in the Windows ment can be supported in the LX-Windows environment.

LX-Windows environment.

In a related development, Microport Systems, Inc. of Scotts Valley,
Calif., has begun shipping Merge 286,
a \$190 software package that combines Locus's Multisystem Merge
with AT&T's Unix System V to con-

with AT&T's Unix System V to Courrently execute Unix and MS-DOS programs on IBM Personal Computer AT-compatible systems. According to Chuck Hickey, chair-man and chief executive officer of Microport, Merge 285 is the first product to allow simultaneous trans-parent execution of both Unix and MS-DOS on Intel 80286-based sys-

tems.

"The exciting thing we're doing is going after people with ATs who have heard about the power of the 285 but are limited by the 640K-byte burrier," he said.

Merge 286 is sold for \$199 bundled with System VAT, a full adaptation of the AT&T-certified Unix System V/286 for IPC ATs and compatibles.

Hickey said he has aspirations for Microport to become the "Boriand of Unix software," selling its product for a fraction of what competitors

# Chins increase board efficiency

PC's Ltd. and Multitech Electronics.

Inc.

Naqvi suggests there is a good chance that many of those vendors will also use the AT/386 Chipset.

Although only a handful of vendors have amounced 8036-based products since the chip was introducted 13 months ago, several system and accelerator board introductions are expected by year's end.

# Portable computers reduce operating costs

### Federal nutrition plan slashes costs by 30%

By David Bright
CHEYENNE, Wyo. — Despite the
Reggan administration's heavy cuts
in health and welfare allocations, as
federally funded outrition program
in Wyoning has managed to purchase nearly \$100,000 worth of portable computer equipment. The investment has paid off, leading to a
\$0% reduction to operating costs and
abara, increase in the mortrant's

Prior to purchasing the equipment for its outritionists, the program re-lied on handwritten forms, the U.S. tal Service and mainframe batch essing to handle some 250,000

processing to handle some 250,000 hocks per year.
Wyoming currently has 14 Special Supplemental Food Program for Women, infants and Children (WTC) project offices serving 33 clains sites across the state. Participants in the program receive checks made out to food stores for the purchase, of diary essentials such as milk, eggs, fruit Juices and baby formsis.

# It is crucial to get the food to the participants as soon as possible, but when the program began, it was handicapped by the slow-moving bu-

sucratic process.
Then, nutritionists filled out mui art forms after in-relewing moth ers at the clinics. In a labyrint process lasting several weeks, the in-formation was then bounced between two mainframes, the state office in Cheyenne and the various clinics. When that process was completed, the state office mailed monthly

cks to the clinics. "The typical turnaround time for all this was sometimes as long as two months," recalls Terry Williams, director of the WIC program. "We had

to void a minimum of 15% of the checks, simply because participants had moved or there was a change in their food prescription. Causing more delay, 5% to 8% of the records had errors, because forms had been incor-rectly filled out, or had errors in key

the program began using Compaq Computer Corp. portable computers in late 1984, however, the computers in tate 1984, however, the turnaround time has been reduced by as much as four weeks, and the checks are printed out at the clinics while the mothers wait. In addition, the need to void checks has been alit eliminated and the nutriti ists' accounting time has been cu 15%, allowing them to handle n participants per day

### The drain on mainframe reso as been reduced by 25%, notes Tony

has been reduced by 25%, notes Tony Minnick, vice president and data pro-cessing manager at American Nation-is Bank of Cheyenne and planner of the program's computerization. The original plan called for a com-puter in each of the preject offices. Since the nutrionists would have to travel between the offices and clinic sites, portable computers seemed to be the logical answer, Minnick says. The Common systems were chosen.

The Compaq systems were chosen cause of their high degree of IBM rsonal Computer compatibility. spaq's solid reputation and the ility of a Cobol compiler for

n cost of the

The computerization cost of the program covered 15 Compaq portable computers, five of which are Compaq Plus portables with 10M-byte hard disk drives; the Cobol compilers, written by Microsoft Corp. for IBM, Masterlink Software, Inc.'s Handte PC-to-mainframe file transfer rkage; software written by the

For connection to the bank's Bur-roughs Corp. mainframe, all of the computers include Hayes Microcom-puter Products, Inc. 1,200 bit/sec.

Except for problems getting sup port for the Cobol compiler and nov system before all the pro been completed, the traz table personal computers was a re tively smooth one, Minnick says.

"We're very pleased at this point," agrees nutritionist Janet Moran, who also helps coordinate the computer operations. When traveling betw nics - which can take as long as nine hours — the outritionists carry the Compaqs and printers in their pickup trucks. She says the 33-lb weight of the systems is not a drawback, but "if you're carrying one for any distance, it gets heavy."

With the Compaqs, the notritionists are able to enter the data water talking to a participant and correct errors immediately. Each nutritionist leaves his PC on at night with the data communications program run-ning. To save on communications costs, the uploading and download-ing of files between the Compages and the mainframe begins each day at 2

Since the Wyoming WIC program compatible laptop computers have bout 12 lb, laptop models from com-anies like IBM, Toshiba America, hc. and Zenith Data Systems Corp. ald seem to be ideal replacements the bulkier Compags, but no nges are planned, even when adonal systems are required.

"Our people are content with what they have right now," Moran says. "They would cut off their right arms before letting anybody take one



# NEC PC put through paces

In Japan, unlike North America and Burope, the de facto standard et by the IBM Personal Computer as played a minor role. Early MS-306 computers from major Japan endors wern? It made compatible with the IBM systems.

with the IBM systems.

Earlier versions of the APC, like the Thady Corp. 2000 and earlier Pulitus Ltd. systems, eschewed IBM compatibility but included additional graphics capabilities. However, none of these systems sold very well in he IIS.

building reputation With APCIV, NEC continues to build on its atrong reputation of offering suphisticated graphica-orient-oil aystense. Although available with DRI Color Graphics Adapter (CGA)-tor, most APCIV sales will be with NEC'S Ethanced Graphics Adapter (EGA)-and CGA-compatible Advanced Graphics Deard and Advanced Graphics Deard and Advanced Graphics Color Display. The latter is desirable and CGA compatible Advanced Graphics Color Display. The latter is desirable and CGA compatible Advanced Graphics Advanced Graphics Color Display. The latter is desirable as NOTO occurations the little desirable as NOTO accordions the little

entical to NBC's excellent Multi-rock obler monitor.

The NBC advanced graphics beard akee use of the Chips and Technol-jes, Inc. BGA chip set to provide apport for all 17 BIM BGA, CGA and onochrome graphics modes. The dvanced Golor Digslay, which has claimed maximum 800- by 560-test resolution, is more than enough support the 640- by 400-pixel BGA

resolution.
With the ability to expand to 10.8 if bytes of random eccess name ry and a built-te controller for up to two 4018-byte hard dashs with a 40-muce access time, the APC IV offers piently of head droom for users needing a big system. It compares favorably with other first-rate products the compang Computer Corp. 's Dealey or 366.

The base unit, with a 1.2M-byte floppy, a 40M-byte hard disk and a keyboard, lists for \$3,996. With a 20M-byte hard disk instead, the list price is \$3,496. The minimum config ion of the APCIV, with only a

82,996. The advanced graphics package, including the Advanced Color Display and Advanced Graphics Board, lists for \$1,325. These aren't exactly bargain base ment prices compared to what the mail-order vendors are offering these days. But they are well below what IBM and Compang are charging for comparable systems.

For a first-class system from a major vendor, the APC IV offers a good value for the money. What's more, it is a good bet that it won't be long before NEC offers a high-end Intel 386-based version of

the APC as well, making use of ROM wares from Phoenix and silicon from Chips and Technologies.
This would be a complementary offering that could boost the momentum NEC in already developing with

All of which adds up, in my opin ion, to a good prospect for NEC to become a real contender in desktop

# Disk managers consolidated

NORWOOD, Mass. — Phoenix Software Associates Ltd. recently introduced a software package for managing information on microcomputer hard disk drives. Called Pdisk, the \$195 program reportedly inproves the performance of IBM Personal Computers, PC XTs, ATs and compatibles.

driven utilities, including an ac-vanced backup and restore program, a park utility that shuts down the hard disk drive when the PC is being moved, thereby reducing the possi-bility of damage and loss of informa-tion; a cache utility and six IBM PC-

# The better you understand the better your company of

# The MIS perspective.

The control you need. At the demand for its management capability has grown, to has the control for its management capability has grown, to has the control of blooking to provide form the control of blooking blookings, and the track record of blooking blookings, and the track record of blooking blookings blookings are control of blookings and blookings are control of blookings and the section of blookings are control of blookings and the section blookings are control of blookings and the section blookings are of our and facility the color of the other blookings options have made it is that only with each control of the other blookings are of our, and facilities fruit in the blookings of the blookings are of our and facilities of the blookings and the blookings are of our and facilities of the blookings are of our and facilities are of our and facilities are of the blookings are of the blookings are of the blookings and the blookings are of the blookings and the blookings are of the blookings and the blookings are of the bl

# Stacking storage peripherals aimed at LANs, CAD/CAM

By David Bright
IRVINE, Calif. — With Western
Digital Corp.'s recently introduced
stacking peripherals, users can interconnect as many as seven storage devices using only one slot inside the

tes using only one some test using only one some test using only one some test users to custom-taimenodations for such lor storage accommodations for such applications as local-area network file serving, computer-alded design and manufacturing, desktop publish-ing and multiuser computing. The Versastak line consists of a se-ries of disk, tape and optical storage

modules that stack on top of a base unit, which is connected to the host computer. Since they incorporate a

built-in Small Computer Systems In-terface bus, the modules can link to a variety of systems in addition to the IBM PC. Compatible systems include the Apple Computer, Inc. Macintosh, the Digital Equipment Corp. Micro-vax and the NCR Corp. Tower.

A key feature of the Ver les is that instead of replacing herals as the technology ad-is, more powerful modules can

which contains a 225-watt power

supply, is connected to an IBM PC system via a host adapter board sup-plied by Western Digital. The board costs \$196 for an IBM Personal Com-puter AT and \$150 for a PC XT. The connection between each interlock-ing module is made by moving one

itch. No cables are involved. Western Digital will offer hard sk drives with formatted capacities

disk drives with formatted capacities of 85M bytes and 170M bytes. The smaller drive features a 30-mec average access time, and the larger drive takes 25 mec to access data. The 85M-byte drive, priced at £2,995, will be smallable in December. The 170M-byte drive, carrying a price of \$3,995, is a scheduled for January

The Versanza ours byte says and operates at 5M bytes per minute in streaming mode. The \$1,395 device will be available in December. Plans also call for a 120M-byte tape module

lao call for a 120M-byte tape module to be ready in February. Western Digital plans to begin hipping its compact disk/read-only semory module in March. Priced at 1,726, each disk can store up to 00M bytes of data. By the second complete a write osce/read many mes unit bolding as much as 300M mes unit bolding as much as 300M mes unit bolding as much as 300M.

The company is also developing Intel Corp. 80286 and 80386 file serv-er processor modules for mid-1987 availability, South said. Versastak is said to be fully

Versastak is said to be fully com-patible with Western Digital's Star-lan hardware and can be integrated into Starian networks. Using West-ern Digital's Netbios software, the Versastak modules will work with IBM's PC Net and other Netbios-com-

stible networks. When used with a PC AT, the Versastak setup can act as a file server storage module for networks from 3Com Corp., Corvus Systems, Inc. and Novell, Inc., according to South.

Software adds

photographs

to data bases

# text management software, an handle the competition.

# The corporate strategist's perspective.

The amount of information that must be factored into major corporate deci-tions is increasing every day. And few categories of information are as sen-

n of any

next. 10 be upon mocessary using and execution of any stative, competitive intelligence to both accurate and action-and available to you absend of expectation. And there's no bel-

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# PHILADELPHIA - Picturewa

PHILADELPHIA — Pictureware, Inc. has developed an integrated not-ware system that incorporates photo-graphs into data bases. In a typical application, the program will be used to add photographs to corporate per-sonnel files.

sonnel files.

According to Pictureware, its Picturepower program provides sharp resolution and clarity in color or black and white. Operating under IBM PC-DOS, the program contains a data base management system, picture capture facility, picture editor, forms generator and data communiforms generator and data

It is also said to be fully compati-ble with Ashton-Tate's Dbase III Plus package, allowing photographs to be added to existing data bases.

With the program's commun-tion utility, photographs and reco lines, direct connections or local-area metworks. The company said still-frame video teleconferencing can be accomplished if Picturepower resides on both of the connected worksta-

The black-and-white version of Picturepower retails for \$795 and the color version is \$995. The video cameras, scanners, video compact disks and other devices for loading the otographs must be obtained sepa-

tely.

The software also requires a video
gitizing board. The picture data
uses are stored on disk drives and
her devices along with alphanu-

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# NonStopVLX.

Tandem technology sets the new standard for large applications in on-line transaction processing.

More transactions per second at a lower cost per transaction than any system in the world.

### THE CIRCUITRY'S BAST.

We designed the system in our own laboratory, right down to our own unique VLSI chips. The result is more circuitry in less space. With fewer components than our next largest system, the VLX delivers twice the performance and reliability



### PROCESSORS WITH LARGE APPETITES. The VLX processors move transactions in 32-bit chunks. They reach into main memory in 64-bit

chunks. Because this happens in parallel, more work gets done in less time at a lower cost per

### THE SERVICE IS EASY.

All critical components are field replaceable. When service is required, it's faster. You don't even have to stop an operation to add or replace components.

### THE DATA EXPRESSWAY

In a conventional database, 1/0 requests must he handled sequentially This creates queues that slow response time. In the VLX system, there are multiple paths to multiple disks. Data enters and leaves the database simultaneously. No time is wasted, and all disk space gets used



### DIAGNOSTICS FROM A DISTANCE.

An integrated microprocessor allows us to monitor the system environment from anywhere in the world. We can even run stress tests remotely. If a failure does occur, the VLX has the capability to automatically dial out to remote centers arriwhere in our worldwide network.

### THE SYSTEM KNOWS THE SYMPTOMS. Expert systems software, using fault analysis, directs the problem diagnosis systematically it also

allows us to analyze it and shorten service time exen more



### SECRETS ARE SAFE. We offer software that will protect the security of

your data whether it's in the VLX, in another Bandem system or in transmission.

### NO GROWING PAINS.

To add power, just add processors. You can grow from a base four-processor system to 16. From there, you can expand in whatever increments you choose, all the way to 255 systems. You never buy more than you need, and you'll never have to rewrite a line of applications code.



### NO-PALIET INSURANCE.

Tandem systems achieve fault-tolerance with a unique, parallel processing architecture. There are no idle back-up components. Instead, multip components share the workload. If one goes down, the others pick up the slack, and application processing is uninterrupted.

### HERE TODAY HERE TOMORROW.

The VLX is compatible with any Tandem system and with all major communications standards -SNA X.25. MAP and O.S.I. And by acting as a gateway to other vendors' systems, the VLX can link them and enhance their value as well.

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To find out what we can do for you, call 900-482-6336 or write to us. Corporate Headquarters: Tandem Computers, Incorporated, 19191 Valico Parkway, Loc. 4-31, Cupertino, CA 95014

**TANDEMCOMPUTERS** 

### Lotus add-on firms form co-op, target corporate users

### HAL developer heads aftermarket group

By Poggy Wott

LOS ANGELES — Lotus Develop-ment Corp. 1-2-3 spreadsheet utili-ties developers and a distributor of 1-2-3 adjunct products have announced they will join forces for a corporate road show and ongoing joint market-

There are possibly millions of Lo-tus 1-2-3 users out there for whom otus is more than a best-selling pro-It's a software environ said Rick Gibson, executive director of The Consortium, Inc., a 4-month-old Los Angeles cooperative.

Many users are unaware of the add-on products and utility program that could make their work easier Gibson said, adding that he envision a \$75 million aftermarket for Lots products in 1987 — many of the products in 1987 - many of the products being sold by The Consor-

'There are possibly millions of Lotus 1-2-3 users out there for whom Lotus is more than a bestselling program. It's a software

environment.' - Rick Gibson The Consortium, inc

m's 17 member companies

ium's 17 member companies.

The Consortium's new business surtner is 4-5-6 World, a 2-year-old santa Barbara, Calif., direct mail and elemarketing firm. Its catalog in-ludes some 300 Lotus add-on products; most of them are software, but ne are accessories of general inter-

some are accessories of general inser-ent to business microcomputer users.

We believe the Lotus aftermarket
is a very strong one," 4-5-6 World
President Charles Everett said. Be
added that 4-6 World had 31 million in sales last year and expects to
casily double to list of 125,000 subactilbers. "There seems to be a great
deal of harmony between the goals d operations of our comp erett said.

Everett said.

The privately owned businesses will continue to operate separately but will share some officers under the cooperative agreement. Eventually, they may operate out of a single office, Everett said.

Within weeks, the new business

Within weeks, the new business partners plan to launch a cross-coun-try corporate tour, demonstrating their Lotus aftermarket products, said Gary Ward, Comsortium director or marketing services. He added that is target is users groups, parti

his target is users groups, particular-ty those within corporations.

"We can help users preserve their investment; said Jim Deline, presi-dent of Clarity Software Corp., which publishes the error checker Cell/Mate and is a Consortium mem-ber. "It zeems they just get used to their technology and it changes." Utility programs will help maintain templates, interfaces and methods dessite uprades in the primary

"Some people say Lotus users only use a fraction of what's on their desks," she said. "This could change that by making Lotus easier and more accessible."

that by making Lotus easier and more accessible."

Paul Gallagher, marketing director of Consumers Software, Inc. in Gil-roy, Calif., said the rising profile of the Lotus aftermarket helped him ar-range with distributor lingraham Software of Buffalo, N.Y., to bundle his Lotus utility, a math checker that is called Spreadsheet Auditor, with

Analyst Jan Lewis of the Pale Alto Research Group in California said ef-forts of The Consortium and 4-5-6 World could actually expand the Lo-tus market as they enhance it. This is The Consortium's Gibson's second venture in the shadow of Louis 1-2-3. He was one of the officers of GNP Development Corp., which developed HAL, a natural query language for 1-2-3. Lotus bought GNP al-

most a year ago and recently released HAL under the Lotus label. "Lotus is validating the Lotus aftermarket,

The Consortium will also expan

to offer a development service and market research branch for the Lotus aftermarket, which Gibson said in-cludes 1-2-3, Symphony and Jazz.

newest member, the Pasadena. Calif., IBM Users Group, coordinated by Eric Wolfe.

A range of programming services will be offered, including work by specialists in financial investment analysis, micro-to-mainframe communications, data base application training and other areas, accord

The Consortium's analysis forecast services will focus on the Lotus market and related products and will include market trends, sales forecasts and studies of various seg-ments of the Lotus aftermarket, Gibson said. Research findings will be



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### **MANAGEMENT**



### Strategic use of info technology

here is now almost total acceptance of the proposition that information technology can provide competitive advantage. There is recognition—after the face—the condition—after the face—the condition—the condition of particularly adept competitions.

But important questions remain un-

But important questions remain un-swered, including, How can we prediet which industries are ready for ma-jor new competitive uses of information technology, providing significant op-portunities? And how can we find stra-

There will always be opport There will always be opportunities in any organization for improvement in internal efficiencies or in reaching out to customers. In established companies in mature industries, these opportuni-ties are rare and difficult to find. I seek

ties are rare and difficult to find. I seek here instead to describe those indus-tries ready for major ahifts in the stra-tegic use of information technology. I assume that, ultimately, markets are efficient and rational. After several years without major changes requiring restructuring or other significant re-agones, available opportunities are rec-onjused and exploited. This is not al-ways true, of course, but options remaining after several years tend to be

remaining after several years tend to be remaining after several years tend to be rare, specific to individual companies and difficult for outsiders to locate and exploit. They are almost always idio-ayneratic and thus nearly impossible to predict or describe in any generic way. See STRATEGO page 85

Clemons is associate professor of de-cision sciences at the University of Pennsylvania's Wharton School.

### Group unites data centers

By David A. Ladham
HARTFORD, Conn. — The Defense and
Space Systems Group (DSS) of United
Technologies Corp. has formed a new information management organization formation management organization aimed at bringing together data centers scattered among the group's operating di-

risions.
Following a six-month study of data processing and communications by a committee of six senior managers, the corporation last month apcorporation last month ap-pointed F. Richard Lennon as vice-president of information ement for DSS. Len ager, was most recently

manager, was most recently vice-president of administra-tion for the group's Sikoraky Aircraft division.

Lennon describes his chief mission as "leveraging" information systems operated by the group's major divisions through standardization and networking, and perhaps consolidation, so that manager divisions, and officers with the matter divisions, and officers.

make greater use of them.

"Each unit has tended to operate relatively autonomously with limited exchange of ideas. I think those days are

passed. We're recognizing the need to bet-ter use the investments we have in people, hardware and software — to bring units

together in more effective critical mass, Lennon said. The direction is particularly important with the creation of relatively small apace-oriented companies and program offices within the group. "They doo't have avail-able to them the resources

able to them the resources they need to be competitive," Lennon declared.

While the organization is also aimed at leveraging the group's information systems' beving power by consolidating

buying power by consolidating it, efficiency is not the only concern. The less of its inforconcern. The less of its infor-mation systems budget the group spends on maintenance—what Leanon terms "mow-ing the grass and raking the leaves"—the more it has for new technologies that will give it "the real competitive leverage we want to gain," Leanon said.



# "We see the power of bringing various units together for various opportunities. If you bring them together as a space compa-ny loosely connected by an information

### Info systems spending rises

By David A. Ladium

The end of the year will likely soe spending on information systems up a relatively modest 8% to 10% from 1985, as companies strive to contain costs and measurements.

sure return on investments, according to an International Data Corp. study. The study quantifies trends toward the linking of personal computers, distributed processors and mainframes; networking

personal computers; connecting incompati-ble equipment; and expanding on-line transaction processing. ns spending by sur-See MFO page 88

### INSIDE

Professional group presents its satiric awards/77 Managers on the Move/78

Calendar: Select-ed conferences, exhibitions, semi nars/79

Some predict multiuser systems will become increasingly impor-tant/90

### INSTANT ANALYSIS

"There is only a hair-breadth's difference between a genuine competitive coup and a harebrained

scheme."

# The Common Sense Data Network





evelcon

# NCR Tower helps Texas drivers move faster overland.

For growing work loads, smart organizations are loading up with smarter computers.

The NCR Tower.™

computer.

Texas has the second largest number of licensed drivers in the country. To speed up traffic in its statewide licensing offices, the Lone Star State installed eighty Towers.

Airborne Express, the overseas delivery service with the sky-high growth record, employs a network of Towers in the Far East to keep track of thousands of international shipments every day. Obviously the Tower is a very versatile



The NCR Tower is actually a family of computers, ranging from a 2-4 user system to a departmental system. Or from a small business network to an international network of hundreds of users. Memory capacity ranges from one to sixteen MB. And for disk storage, from 25 MB to over 5.5 gigabytes. Networking and communications are easy because the Tower supports all major protocols, including SNA, X25.

The NCR Tower offers a choice of operating systems: UNIX System V\* and RM/COS\* And every Tower is designed with open systems architecture to work with industry standard hard-

ware and software.

What's more, NCR backs the Tower with one of
the world's largest service organizations. With 16,000
engineers on call, expert NCR service is as close as the
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And Airborne Express move smoother overseas.

The NCR Tower. Because smart businesses need smarter computers.



### Harvard professor cites winners in strategic info systems

Praises initiative in winning market share

Borld A. Luffern BOSTON — The capture, mainte-nice and manipulation of data can also the difference between success in inertia in the realm of strategic vernation systems, according to ward Business School Professor yen McFarlan.

ren McParian.

titiative and preparation have crucial to the winning of market crucial to the winning of market et through strategic use of interest in a keynote ease at last week's Second Annual are Users Group Meeting. A spector of the strategic and the strategic are information systems at load and specific properties better of several corporate boate at the strategic and a specific properties of the strategic and a specific properties of several corporate boate at the strategic properties of the strategic properties of the strategic properties of the strategic properties of the strategic properties and the strategic properties and the strategic properties are strategic properties and the strategic properties are strategic properties.

ere has been a conspicuou ategic use of information : eting of automobiles —



n said. "I sul of the genuinely primitive com-es in the United States as far as our largest a

Motors, our largest automotive com-pany, "he observed that crassins.
McPartan explained that crassins.
McPartan explained that crassins.
McPartan explained the con-trocated that he buys a car every four-to 674 years. But when he was ready or Tocused, direct contact "from auto-focused, direct contact" from auto-most pell success in the strategic use on information systems. McPartan suggested. These focused, customer-tion architecture underneath it, and

architecture underneath it, and su don't have that information ar-

you don't have that information ar-hitecture you can't, in fact, offer lose kinds of services, "he said. Sometimes the value of the archi-cture cannot be estimated, McPar-n added. "You've got to invest as a atter of faith and flexibility," he

sintained. By contrast, McParian offered the ample of Northwest Mutual Insur-ce Co., where he held four life in-rance policies. He wanted to know e value of the policies to determine w much money he could borrow ainst them, but the insurer seemed

tion in its correspondence.

It is a correspondence of the cert is an erform, it because advantageous for Northwest Mustatu is lost a consistence of the policy values. That was possible because a relational matrice pertaining to one customer, Marchael and the continued of the continued of the certain of the continued of the certain of the continued of the certain of the certain

The notion of cheap, portable in-telligench and from a whole new to of applications." McParlan asid. Thompsessis and driving a much Thompsessis and driving a much lyses out to the point of customer contact. ... allowing subsamen to better those from that are out there first. Those from that are out there first. McParlan span he presentation around a list of six types of computer applications that characterize a new give a substantial of the computer applications that characterize as were gir advantages. They are the follow-ing.

Interorganizational systems that link companies to customers or sup-pliers, most notably American Air-line's Sabre reservations system.
 Expect systems, such as the one used by The Travelers.
 Systems

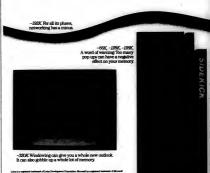
Systems that deliver major cost

Management control system
 such as Northwest Mutual's relati

such as Northwest Mutual's relation-al data base.

• Systems that redefine industry boundaries, such as Imperial Chemi-cal Industries PLC's personal com-puter-based order-entry system for farmers.

I he me



### MIS group relies on comedy, satire to benefit DP illiterates

y Joffry Booler
DANVILLE, Calif. — An offbeat
rofessional association that rose to
some in the early 1980s and then died
at the vine only a few months later is

it six years ago, DP consu opal Kapur and George Glass sed the need for a light-hear cognized the need for a light-heart-alternative to the industry's many remittingly earnest professional cicties. With the help of several of eir equally prominent colleagues, ey formed the International Per-phood of literate Programmers (IPIP), which immediately became renowned for its deliberately outra-

Although their brainchild quickly structed a large following, the ounders lacked the organizational sperience to get IPIP off the ground. When it came to running a profes-ional association. We was allsional association, we were illiter-ate," Kapur quipped during a inter-view in his office.

view in his office.

Kapur and his soncistee were particularly stynised by their inability to find a qualified editor in child of the result o

pears to be experiencing a long-de-layed revival. Having recently hired an editor, Kapur is now busily useen-bling an IPIP board of directors, re-suming a drive for prospective mem-bers and directing his attorney to register the group as a nonprofit or-register the group as a nonprofit or-

rmer incurration, irir was ce, impish sense of humor and fiaence, impish sense of humor and fla-grant disregard for convention. Six years later, the group's love of high jinks remains undimmed. As noon as it gets back on its feet, for example, IPIP hopes to issue each of its mem-bers an identification button, which

conference "every 13 or 14 he added, and has pre-On the surface, IPIP might stril al observers as little more than a oction of frivolous pranksters. beneath its mask of seeming jocu-

rity lies a strong sense of purportion Like most other MIS-orie Like most other MIS-oriented trade associations, IPIP sees its main role as educational. In particular, the organization aims to promote excelnce in the information systems eld by highlighting its many prob-ms and working to correct them,

apur said.

But where most other trade groups raject an image of erudition and sofety. IPIP enthusiastically emiety, IPIP enthusiasticary en-aces satire and comedy. A case in-int is the society's proposed Digital ak Award, which will be presented maily to recognize 'outstanding spidity in MIS," Kapur said.

IPIP also plans to sponsor a num-er of tongue-in-cheek seminars or ectures and will bestow its so-called lectures and will bestow its so-called Preedom Award on developers of programs that run a whole year with-out any discernible logic errors. As punishment for their exceptional competence, all Freedom Award win-ners will be required to pay IPIP a to-ken fine, Kapur said.

aven nne, sapur said.
"Sometimes, satire is a much more
effective way of criticizing problems
or abuses than seriousness," accord
ing to "JIP" editor Len Granka."
expect IPIP to bring a much-needes
touch of lightness to a profession
that all too often takes itself far too

Another feature that different ee IPIP from many conventions akes IPIP from many conventionas trade associations is its emphasis on the practical rather than theoretical or academic side of information sys-tems, Kapur said. Each issue of "IPI," for example, will include a section called Bindsight, where con-tributors will explain how they would approach their systems pro-jects differently if they had the jobs

sca differently if they had the Jobs Job all lover again.

BTP is predicated to the belief properties of the properties of the properties contained to the properties of the Most are characterized by a retu-sance to read trade literature, rub clause to read trade literature, rub clause to read trade literature, rub clause properties with red users or enhence in-sured to the properties of the Such employees, because they suf-er from the severat form of text-

Such employees, because they suf-fer from the severest form of techno-logical illiteracy, "won't find IPI the least bit appealing and wol't un-derstand its purpose," he added. Other illiteraces, however, are knowindgeable emough at least to re-cognize their disability and tro-copinze their disability and tro-copinze their disability and tro-copinze their disability and tro-coverome it. This latter category of technological illiterates is the group to which IPIP primarily hopes to ap-neal. Kapur said.

peal, Kapur said IPIP's annual membership fee is IFIF's annual membership fee is \$49.99, and the organization may be reached at P.O. Box 386, Danville, Calif. 94526. Roughly 60% of each fee will go into a scholarship fund for college MIS students.







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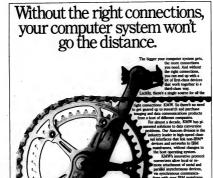
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Laformation Center Implementa-tions: Read Issues. New York. Nov. Consultant. Inc. 70. Dos. 727. Id. See The Internation Center Implementa-tions: Read Issues. New York. Nov. Consultant. Inc. 70. Dos. 727. Id. See The Internation Collands. New The Internation Collands. New The Internation Collands. New March 1997. In Control of the March 1997. Association. Suite 800, 650 New Jurgey Association. Suite Suite Computers and Instructional Association for the Development of Computers Band Instructional Species Association for the Development of Computers and Instructional April 1997. Association of Computers and Association for the Development of Computers and Instructional Processing Species (Instructional Con-ternation of Computers and Con-ternation of Computers and Computers and Computers and Computers and Computers as Management for Computers as Management for Com-

m, wasn. vezzo. Computers & Management for structors Conference & Exposi-m. San Francisco, Nov. 10-13 — etact: Irene Nelson, Fleishman &

Linden Expositions Group, 2401 Plum Grove Road, Palatine, III. 60067.

60067. International Conference on Computer-Aided Design. Santa Clarz, Calif., Nov. 10-13 — Contact: IEEE Computer Society, 1730 Massa-chusetts Ave. N.W., Washington,

D.C. 2003s.

Comdex/Fall '86. Las Vegas, Nov.
10-14 — Contact: The Interface
Group, 300 First Ave., Needham, Group, 300 Mass, 02194.

Mann. 02194.
T-1 and SIN: Seizing Economic Control of the Network. Nov. 11-12.
New York — Contact: The Yankee Group, Seminar Division, 14th Floor, 98 Broad St., Boston, Mans C2110.
Autofact 36 and Sensors 36. Dertol, Nov. 11-14 — Contact Society of Manufacturing Engineers, Postoro, 11-14 — Contact Society of Manufacturing Engineers, Postorom, Nov. 11-14 — Contact Society of Manufacturing Engineers, Postorom, Nov. 11-14 — Contact Society of Manufacturing Engineers, Postorom, Nov. 11-14 — Contact Society of Manufacturing Engineers, Postorom, Nov. 11-14 — Contact Society of Manufacturing Engineers, Postorom, Nov. 11-14 — Contact Society of Manufacturing Contact Society (Nov. 11-14). tich. 48121

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Fashington, D.C., Nov. 12-14 — Consct: Gail Montgomery, Conference
registrar, Institute for Graphic Comunication, 375 Commonwealth

Registrar, Institute for Graphic Com-munication, 375 Commonwealth Ave., Boston, Mass. 02115. National Conference on Building and Operating Defect-Free Soft-ware. Orlando, Fla., Nov. 12-14 — Contact Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla.

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Managing the Strategic Data
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Planning Project. San Francisco,
Nov. 17-19 — Contact: Software Institute of America, Inc., 8 Windoor

Telecommunications Markets: The Impact of IBM. Stamford, Conn., Nov. 17-19 — Contact: Christine

nov. 17-18 — Contact: Christine Sherman, International Resource De-velopment, Inc., 6 Prowitt St., Nor-walt, Com., 08855. Thirteenth Annual Computer Sc-carity Conference, Atlanta, Nov., 17-19 — Contact: Computer Security In-stitute, 360 Church St., Northboro, Mass. 01832.

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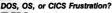
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riching Better Computer SoftDecemberation for Uners.
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### NOV. 30-DEC. 6

Engineering Workstations and the PC. Bedford, Mass., Dec. 1-3 — Contact: Institute for Graphic Com-munication, 375 Commonwealth

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D.C. The Next Five Years. San Prancisco, Dec. 3-4 — Contact: The Yankee Group, Sentinar Division, 14th Floor, 59 Broad St., Boston, Mass. 02110.

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Electronic Mail Industry Conference. Dec. 3-4, Washington, D.C. —

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N.Y. 1020. Also being held Dec. 8-11 in New York. The 1988 Computerised Plan Ad-ministration Institute. Hollywood, Pla., 'Dec. 3-5 — Contact: Registra-tions Department, International Poundation, P.O. Box 69, Brookfield, Wis. 53008.

California Computer Show. Palo Alto, Calif., Dec. 4 — Contact: Norm De Nardi Enterprises, Suite 204, 289 S. San Antonio Road, Los Altos, Calif.

94022.
Software Rapid Pretotyping, Dal-las, Dec. 4-5 — Contact: EPDFMA. Seminars, Dept. SRP, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held Dec. 11-12 in Anabeim, Calif. Anaheim, Calif.
Strategic Planning and Informa-tion Systems. New York, Dec. 4-5 —
Contact: New York University, School of Continuing Education, Sem-inar Center, 575 Madison Ave., New York, N.Y. 10022.

**DECEMBER 7-13** 

Software Testing Management Workshops. Jacksonville, Fla., Dec. 7-12 — Contact: Sandra Wasser, Software Quality Engineering, Suito 16, 3015 Hartley Road, Jacksonville, Fla. 32217. Also being held Peb. 16-20 in Orlando, Fla., and March 1-6 in

San Diego.

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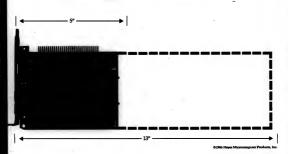
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postervy, 9-12 — Contact: Professional Association for Computing and Information Technology in Higher Educa-tion, 737 29th St., Boulder Colo. 80903. Software information Dec. 11 t: James Ettwein, In-ional Datatek, 7 Carriage Drive, Acton, Mass. 01720. ACE's Third Annual Com-

puter Education Confer-ence. New York, Dec. 13 — Contact: Association of Com-puter Educators, Inc., 751 Bard Ave., Staten Island,

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tions, Inc., 38 Chauncy St., Boston, Mass. 02111. Advanced Manufacturing Systems-West '87. Annheim, Calif., Dec. 15-17 — Contact: John Frett or Bill Harrington, y St., Cos

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Consulting Skills. Washing-ton, Dec. 16-18 — Contact: American Management Asso-ciation, 135 W. 504h St., New York, N.Y. 10020. Dexpo East 86 Show and Microcomputer Graphics Show. New York, Dec. 17-19 — Contact: Expoconsul Is — Contact: Expoconsul Is — Contact: Appoint Is december 1 - 1 Indepen-tence Way, Princeton, N.J. 08540.

### JANUARY 4-10

Hawáii International Conference on System Sciences, Kallus-Kon, Hawaii, Jan. 6-9 — Contact: Center for Executive Development, College of Business Administration, University of Hawaii, B-101, 2404 Maile Way, Honolule, Hawaii 19652. Present, Calif., Jan. 7-10 — Contact: Uni-Opp. P.O. Box 27087, Concord, Calif. Jan. 7-10 — Contact: Uni-Opp. P.O. Box 27087, Concord, Calif. 94527.

### JANUARY 11-17

Business Astomation Forum. Fort Lauderdale, Fla., Jan. 11-14 — Contact: Recog-nition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. Interfacing Sensors with the IBM PC. Madison, Wis., Jan. 12-14 — Contact: De-

Jan. 12-14 — Contact: De-partment of Engineering Pro-fessional Development, Uni-versity of Wisconsin at Madison, 432 N. Lake St., Madison, Wis. S706. Wister MAP,TOP Users Group Meeting, Phoenix, Jan. 13-14 — Contact: Soci-ety of Manufacturing Engi-neers, Technical Activities Division, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

48121.
Computer Graphics '87.
San Diego, Jan. 14-16 — Contact: Carol Every, Industry
Representative, Frost & Sullivan, Inc., 106 Fulton St., Very
York, N.Y. 10038.
The Society for Computer
Simulation 1987 MultiMarketter of Contact SCS, P.O.
Box 17900, San Diego, Calif.
92117.

### **JANUARY 18-24**

Facific Telecommunica-tions Council Ninth Annual Conference. Bosolulu, Ha-waii, Jan. 18-21 — Contact: PTC '87, Room 308, 1110 University Ave., Honolulu, Hawaii 96826.

Hawaii 96826.
Comlease Winter. New Orleans, Jan. 19-23 — Contact: The Information Exchange, 3825-1 S. George Mason Drive, Falls Church, Va.

22041.

Bascoa-West. Los Angeles, Jan. 20-21 — Contact:
The Bas/Board Users Show &
Conference, No. 116, 17100
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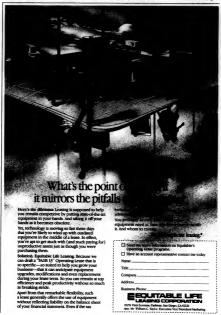
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### Info systems spending rises

estee. IDC sees rapid growth in the linking of personal computers to mainframes or local-area networks (IAN). While, 66% of personal computers stood alone at the end of 1988, stand-slones will account for only 40% of the PCa by the end of this year, even as the total number of personal computers grows 25%, according to the firm.

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node. Asked about the most crit-cal criteria in system selec-ion, more than 80% of re-possdents mentioned 99.9% gridne. Transaction process-ing was cited by 60% more suppondents than was batch apability. Other top concerns were tata base management and multimoressimi ordions.

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### FEBRUARY 1-6

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### COMPUTER INDUSTRY

### Arbitrageurs in board room?

Comman has not seen seen in computer industry headlines of late, having recently aimed his take-over millions at targets in the trucking and retail grocery businesses. But Edei-man's characteristic philosophy — that the sum of a company's parts is greate than its whole — is rapidly replacing the megamerger as the modus operand of computer industry restructuring.

the megamerajer as the modus operands of computer industry restructuring.

The Cerberna Group, Inc., a research group in the company of the computer of the company of the

Uced Corp., the reasty wing gam now-bern files.

In a major to be a major to be a more to be a

Wilder is Computerworld's senior editor, computer industry.

# More chip mergers foreseen

Fairchild-Fuitsu deal could be omen for U.S. industry

By James A. Martin
The recently announced merger b
tween U.S. manufacturer Fairchild Sen

tween U.S. manufacturer Fairchild Semi-conductor Corp. and Japan-hande Figliam Ltd. is expected to be followed by similar concolidations in the received-riddled U.S. chip Industry, analysis say. "We are going to see more and more alli-ductor manufacturers in the friture, due ductor manufacturers in the friture, due compared to American currency," says, Andrew S. Rapapoort, president of The Technology Research Group, a market re-search firm in Boston.

'it is becoming harder and harder to manufacture semiconductors profitably in the U.S. and easier to do so in Japan," Rap-paport says. "As a result, we've been ex-pecting partnerships to develop where

manuacturers would perform the capital-intensive parts, such as manufacturing." Schlumberger Ltd. of New York said re-cently it had signed an agreement in prin-ciple to merge its Cupertino, Calif.-based Fairchild Senionadustor Corp. with Pu-jitum Ltd.'s U.S. semiconductor opperations in San Diego [CW, Oct. 27]. Pujitus will own approximately 80% of the venture and will

appraciatedly 80% of the venture and will make a substantial equity investment in Fairchild, according to a joint statement. The merger, expected to be complete by the end of the year, allows Pulitus to itserd years of the property of the

by targeting the U.S. semiconductor ind

### "IBM strikes us as being in a long term state of Compaq growth

slows, but profits up

HOUSTON — Although its growth rate slowed considerably, Compaq Computer Corp. continued to soar above its micro-computer rivals in the third quarter ended Sept. 30.

Sept. 30.

Compaq reported that profits rose 39% to 88.7 million, or 28 cents per abare, on a 12% increase in sales. In the year-ago quarter, Compaq sarned 96.3 million, or 21 cents per abare. Revenue in the poor recent quarter was \$147.2 million, up from \$131.7 million last year.

\$131.7 million last year.

"The company has consistently outperformed the industry, and I didn't see that changing in this quarter," said Bruce Lupatkin, as analyst with Hambrecht & Quist in San Prancisco.

Compag's results were impressive in an industry segment marked by cutthrost competition and deep price cutting. But

### INSIDE E-mail vendors

shift their strategies in a sagging market/98

Esprit Systems recovers from ten nal illness/98

Texas Instruments will cut 1.000 more jobs/100

Mergers and acquisitions slow down in first half of 1986/108

### INSTANT ANALYSIS

siege by DEC. and continuous price reductions may have to be resort ed to in order to forestall too rapid an erosion in mar-

ket share."

# An Wang says entrepreneurial road has become tougher

### Reflects on triumphs. errors of 35-year career

things An Wang would do differently if he were starting over today, realiz-ing that one can no longer launch a \$2.5 billion company with \$600 in

savings. That is the amount of money Wang used to open Wang Laboratories, Inc. in 1961, six years after be fled wartorn China to study at Harvard University. He says that circumstances have changed, making it harder for an entrepreneur to get started when leaving Harvard or any other school of the saving Harvard or any other school

preseurs, the first thing they have to do is to call on the venture capitalists to try to bring in a few million dollars to start a business if they don't have it themselves, "Wang said in a recent Computerworld interview. "You can't advise someone to start with "half your \$450."

### Wang, chairman of Wang La ories, made these observations ompleting his autobiography.

The book traces the personal life of Wang, born in Shanghai, from the years of civil war in China and the Japanese invasion during World War II., through his education at Harvard and the days when Wang Labs was a



Bugene Linden, then follows the growth of Wang Labs through its phases as a machine tool control sup-

its recent history as a pioneer in the office automation field.

Wang said that among the lessons from which he drew the title was

that he should not have ceded even limited control of his venture to out-

He says now that it was unneceshe says now that it was unnecessary for him to exchange a 25% interest in Wang Labn for \$150,000 in equity investment and loans from Cleveland-based Warner & Swasey Co. In 1959.

Wang said that while Warner & Swazey did not abuse their power, he wanted to keep control of the compa-ny within the corporation in which he, his family and close associates are the largest stockholders.

He also regrets having allowed outsiders to market his products and advises managers of growing compa

nies to avoid reliance on such agree-

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### Despite recent gains, Cullinet must prove itself to skeptics



n Oct. 24, shares of Crillinet
Software, inc. (CUIL—984)
shot up 24% following weeks
of languishing in the 86 range. No
new corporate developments
caused the jump, which observers
stributed to institutional buying.
Tes excording to analysis, many investors remain skeptical about Cullinet's prospects despite hearing
the company outline its turnaround

During the past year, callinet's sales in list core maintrame data base onliver a business suffered week industry conditions and here physical conditions are here physical conditions and here physical conditions are listenated presented and development. Such spensing in a development, Such spensing in a listen's July 1986 quarter 610 million into the red.

Nevertheless, analysts consider

rate revenue last year.

A key to Cullinet's efforts in addressing minicomputer data base

Porteus is president of Strand Re-search Associates, a Centerville, Mass.-based company that provides customized research services for fi-nancial and high-tech firms.

VAX company.
William Shattuck, software analyst with Montgomery Securities,
says that once Cullinet delivers
acoftware products for the VAX, its
marketing strength will be in supporting and integrating multiven-

porting and integrating mustive-dor architectures. Rick Sherlund, analyst with Goldman Sacha & Co., speculates that Callinet will also "take some of the truly relational data base capa-bilities of Ewel's software and fold shem into IDMS/R over the next

30, will inducate now successful in company is in promoting its new strategy to the corporate market, according to Sherhand. "But now, there is no visibility to improving business conditions for Cullinet,"

basilises constitutes for clusters, bearings and constitutes for the second quarter, which could not be considered as a considered properties of the constitutes of the constitutes of the could not be considered as a constitute of the could not be constituted as a constitute of the constitute of the

riented investors.

But Shattuck of Montgomery Searities says investors should buy allilinet at current depressed rices. He says Cullinet's stock suid, within a year, double in valify of from its recent 86 range, even ough a major improvement in urrent earnings or revenue is not heip the stock is changing invest expectations of Cullinet getting back on its feet," Shattuck says.

### Krowe named to IBM board

By Cliebes Wilder
ARMONK, N.Y. — Less than two
weeks after placing Senior Vice-President Allen J. Krowe in charge of
three of its most critical business
units, IBM last week elected Krowe to

units, IBM last west even.

Is board of directors.

Krowe became the fifth senior vice-president on IBM's 21-member board and the first to be named since Jack D. Koehler last Jan. 28. The others are George B. Betzel, Nicholas Katzenbach and Dean P. Phypers.

Selven responsibility on siven responsibility on the present present the present pr

Oct. 17 for IBM's Rolm Corp. subsid-iary, its personal computers and ter-minals until and its mid-range com-puter and low-end storage divisions. IBM analysts believe the company is depending on Krowe, a dynamics and outgoing executive, to bolsterate IBM's sales and profits in those areas as as its traditionally lucrative main-frame business continues to slow dense.

In another move, group executive George H. Conrades became one of 10 IBM senior vice-months







### E-mail firms remodel product lines to find profitable niches

Zapmail's demise dampens optimism

y Elizabeth Horwitt
Pollowing the demine of Pederal
xpress Corp.'s Zapenal service, serral electronic mail service compates are revamping their product
ness and sales strategies in an attempt to find profitable piches in a

gging market.
"We recently got a call from a cus-mer who said, 'Zapmail is dead, so nat's the future for the rest of the himess?" says Thomas Malone, ex-tive director of domestic Telemail vices for Telemet Communications

Corp., a subsidiary of U.S. Sprint Communications Co.

"We're seeing not exactly a mar-ket shakeout, but certainly a retrac-tion," Malone adds.

Analyst forwards of the

Analyst forecasts of the generic electronic mail market have lost ectronic mail market have lost me of their initial optimism during e last two years. A five-year for-est of the electronic mail market iblished in 1984 by International its Corp. subsidiary Link Re-urces, Inc. predicted that electronic

mail service revenue would total \$935.5 billion by 1986. In contrast, Link's 1985 forecast estimated 1985 revenues of \$450 billion. this gloomy outlook, companies such

as Telenet and General Electric Infor-mation Services Co. (GEISCO) have recently refined and even expanded their marketing strategies. Telenet, for example, has quadru-pied its Telemail staff in the past 18 months, Malone says. The company

also plans to step up investment in marketing and business areas, he

"We feel that the time has final we reet that the time has finally come to invest, where we had been holding back before," Malone says-Telenet is attempting to capitalise on a broader range of installed commu-nications devices and microcomput-

ns customization and training. Few of our clients are intere-

reflectronic mail by itself, but a number want electronic mail and fac-imile services internationally," says effrey Held, a group manager at the Fairfax, Va., research company N work Strategies, Inc. A number of international com

nies cannot afford to pay exorbitant leased-line costs abroad, according to

"A 9.6K bit/sec. leased-line link from Hong Kong to Tokyo costs about the same as a 56K bit/sec. satellite link from Californis to Hong Kong— about \$20,000. PTTs [Postal Tele-phone and Thistorneh command. phone and Telegraph companies are charging what they can get away with, so it's cheaper to use a vendor shared service," Held says.

In the increasingly competitive in-ternational market, MCI Communica-tions Corp. has at least one special

tions Gorp. has at least one special strength; its ability to interface MCI Mail directly with Digital Equipment. Corp's All-li-l mail system. This may be the deciding factor for one of Held's clients, who is cur-rently looking for an electronic mail system to link U.S. headquarters with a branch in Japan, according to

A major strength for GEISCO's in-ternational marketing effort is its long-established relations with many foreign PTTs, Held says. "Internationally, success is on a personal level. The PTTs like to work with peoplithey know, so established carrier get things done faster, if not mor cheaply," he adds.

verting costs

MCI and Telenet may be able to control networking costs more effec-tively than GESSCO, whose extensive uively than GESCO, whose extensive leased-line network in vulnerable to carrier rate linerases, which have been considered to the carrier rate linerases, which have been provided by the control of the carrier rate linerases, which have been provided by the carrier land ground lines will be a major plan for breast in both to a major plan for breast in both carrier land ground lines will be a major plan for breast in both carrier land ground lines will be a major line of the carrier land ground lines and provided the carrier land ground lines are carried to the carrier land ground lines are carried to the carrier land ground lines and the carrier land ground lines are carried to the carrie

that "keeping costs down is a critical competitive factor."

Both GEISCO and Telenet are beginning to offer customization services, tailoring electronic mail applications to each company's networking needs.

GEISCO last week introduced Businesstalk, a commercial version of a product that was eriginally developed to link Apple Computer, Inc.'s dealer network.

oped to first Apple Computer, Inc.'s dealer network. Telenet is broadening its market-ing efforts beyond the Portune 1,500 to the biggest 10,000 companies in specific application niches such as sales, order entry and claims process ing Malone ear-

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summary of your qualifications to: Amdahl Corporation, Employment Department, Dept. 11-3, P.O. Box 3470, M/S 300, Sunnyvale, California 94088-3470.

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### Esprit Systems' metamorphosis keeps terminal vendor alive

n was reeting from revo-tion in its mainstay ASCII outliness, and its microcom-sion — acquired only a er — was hemorrhaging rit, coming off a year when

for its terminals. Yet in reality, it al-most cost Sasos the company.

"Bight after we aske the acquire.

"Bight after was made the acquire.
Sasop painfully recalls. "The terminals business was hard enough to survive without taking on a business in its early stages that required heavy product development and mar-tecting costs. In retrospect, perhaps our money would have been better

ther. in March 1985, Esprit was the first company to match ITT's Qume Corp. \$395 no-frills terminal by siashing the price of its own entry-ievel unit. The result, predicated on Esprit's desire to maintain market share, contributed heavily to its fis-cal 1985 losses.

where Construction Construction of the Construction Construction Construction Construction Construction, "any Greg Blanchi, an another construction," any Greg Blanchi, an another construction," any Greg Blanchi, an another construction," and construction, "any Greg Blanchi, an another construction, and construction Construction," and construction Construction, and construction Construction, and construction Construction, and construction Construction, and co

market share slipped from 6.6% the previous year.

"That was not an unusual occupmarket was not an unusual occupmarket was not an unusual occuplibratic says." "Syse Technology, inc. explosed onto the scene, doubing its volume, and left everyone taught Seaso an important season. "Two don't bay market share in this business, you only rest it," he quipe, market share in this business, you only rest it," he quipe, market share the same share the same taught Seaso as important season. "Two don't be taught Season Season



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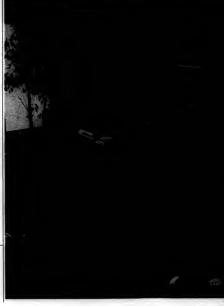
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### Ailing chip market forces TI to cut 1,000 jobs worldwide

### Layoffs target administrative employees

rily on administ and less on prod ers, Victor said. ring the third q ear, TI eliminated

Worldwide TI employment shrank from 85,655 to 77,872 in 1985. Following the semi-conductor staff cuts and in-creased hiring in its defense electronics division this year, the company's staff now totals 78,000. Overall, TI reported third-quarter sales of \$1.25 billion, up 5% from \$1.19 billion a year ago.



### Despite \$9M loss, CDC edges its way back toward black

By Cliston Wider
MINNEAPOLIS — Edging
closer to profitability for the
first time in almost two
years, Control Data Corp. recently reported a loss of \$9.3
million, or 23 cents per share,
for the third quarter ended
land 30,

the recent quarter due to di-vestitures and investment re-

Revenue resulting from CDC's trimmed-down com-puter business was \$818.5 million, 8% less than levels of or the through the period of the results included an operating loss of \$1.9 million, compared with an \$83.3 mil-

Although CDC has fought its way back from a severe debt crisis and the worst rethe year-earlier period.

CDC took a nonrecurring loss of \$11.4 million during

ot crists and the worst re-its in the company's histo-during the past seven arters, Chairman and CBO bert M. Price hinted that e firm will not return to the

in computer systems produc-tion, according to Michael

neapolis-based Piper fray & Hopwood. lamilton said CDC has

fourth quarter. That could very well me additional layoffs, probal

ery, but he said he finds the industry itself is still slug-

gish.
"1995 is better than 1985 for data storage, but the long-term market prospect is still a question mark," flamit-ton said. "And CDC will need some real growth in the mainframe business. They're still walking through some soggy ground."

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### More chip mergers seen

try for growth, and then Fe-jitsu buys into Pairchild, the company that busically start-ed the U.S. chip industry." Schlumberger said it would take a \$200 million

sarge in the fourth quarter se to terms of the agree-

Gue to terms of the agree-ment, apparently less than half of what it paid for Pair-child in 1979.
"Pairchild was a weak sis-ter, and Schlumberger tired of playing sugar daddy," says Michael Gumport, semi-

"

Fairchild was a weak sister, and Schlumberger

conductor analyst with Drexel Burnham Lambert, Inc. in New York. "So they sold out rather-cheaply to the vation was to beat the U.S.-Japan trade accords and get a very sweet deal, well below book value." Although ana-lysts perceived the Fairchildlysts perceived the Pairchild-Pailtsu agreement as a sign of further erosion in the U.S. chip industry, such partnerships do not necessarily fore-tell impending doom. "If future partnerships are true alliances, they could

he positive for the industry," Rappaport says. "But a con-trolling interest purchased by the Japanese is not as pos-itive as a partnership where the responsibilities are divid-ed up between independent yet cooperating com would hate to see U.S. semi-conductor companies be ac-quired and controlled by Jap-

any will have a board of dirs composed of repre concerns. Donald W. Brooks, president and CEO of Pair-

will retain that title and du

### COMPUTER INDUSTRY



### Compaq growth slows, profits up

From code 91

they were below Compaq's own first two quarters of 1986, when profits one 80% and 70%, respectively.

"There was very allow real unit, growth in the U.S. during the quarter until September, when we saw a rather dramatic pickup in Intel Corp. 90286-based products," Lopatin add. "The high-end atrength also showed up in strong sales of the Ap-ple Computer, Inc. Mactinoids." Ap-

That trend plays right to the

ted it is fairly immune from the in-sion of low-priced Asian IBM Per-nal Computer clones because of its run on large corporate users neek-top-of-the-line micros with super service and support.

rior service and support

However, Compação overall marlett share has been eroding in the retail dealer mariet, which is its sole
distribution channel. Compaçã doilar mariet share fell from 15% in
July to its lowest level of the year of
\$% in August, according to the
monthly dealer survey by Infoorn, a
Coppertino, Calif., mariete research

firm.

Daring the third quarter, Compaqintroduced the Designo 386, a much-heraided 32-bit micro based on the Intel 80386 chip. Lapatkin predicted that. Compaq will ship between 20,000 and 25,000 units of the model before the end of the year.





couple of keystrokes. Leave one program and jump to another. And you can select and edit information from several different programs. Then quickly combine and print it all on a single piece of paper.

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In addition, you get Windows Write, a graphically-based word processing program. And Windows Paint, a simple, easy to use

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vour Microsoft dealer. And take a really good look into Windows.

# Aicrosoft Windows The High Performance Software

For the name of the inspire Microsoft death, and 1985) (SAMME, In Michigan State and Michie, 1974; microsom in various and all MCCOS or reposed valency of the found Companies (30 to a superal state of Loss Designation Companies (30 to 1 a s a part of the companies of Loss II a a superal state of the Companies of Loss Office (30 to 1 a s a superal state of the Companies of the Samme Spatial Samme State (30 to 1 a s a superal state of the Companies of the Samme Spatial Samme State (30 to 1 a s a superal state of the Companies Spatial Samme State (30 to 1 a s a superal state of the Companies Spatial Samme State (30 to 1 a s a superal state of the Companies Spatial State (30 to 1 a s a superal state of the Companies Spatial State (30 to 1 a s a superal state of the Companies Spatial State (30 to 1 a s a superal state of the Companies Spatial State (30 to 1 a s a superal state of the Companies Spatial Spatial

### Arbitrageurs in the board room? From page 91

figure out a name or a corporate headquarters site. The merger and acquisition action has shifted, for the most part, to the bits and pieces approach. In every industry segment, major vendors are shedding, diventing and spinning off business units that don't fit, don't make mostey or would just appear to be better off on their own.

The list is a long one, including. Burroughs' Memorex Corp. subsi isry; Control Data Corp.'s Commodal Credit Co.; Sperry's Aerospa and Marine Division, and, among most extreme examples, Norcros Ga.-based Intelligent Systems Co. Intelligent Systems, which base

month announced a complete rever-sal of course. It put itself up for sale, most likely via a piecemeal sell-off of

most likely via a paccement self-off of its various business units.

The bottom line in this unusual approach is fairly simple. The day after Intelligent Systems announced it was out to woo suitors, its stock price jumped about 36%. Intelligent lystems executives say they are try-ng to cut the best deal for their chareholders, and the latter evident

considerations seem to be the motivating force behind computer industry wheeling and dealing. Admitted by, no one but the most naive observer would think that such mot vations are ever absent from corporate strategy decisions.

Nonetheles

nt Systems' stable to go to ion block, edged closer to a a highly secretive negotia-



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cs and Planning Service and be a part of the accepted solution to computer equipment applaising

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that ultimately may be found in-

not to compete, you can bet that old firm will be eyeballing the fi

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Comparison is worth the effort. The 2020 will raise your expectations about display terminals.



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### CDC coordinates R&D to achieve corporatewide benefits

#### Business units to share technology advances

cal officer and vice-press arch and engineering. Two months ago, CDC es corporate research and en fice under White's direct dinate all of the comp

street uneset White's direction to co-cledinate all of the company's re-definition of the company's re-tification of the company's re-tification of the company's re-oriented by the computer systems of cats storage, computer systems overtiment systems and ETA Syn-los order to focus the efforts, CDC as identified four of what White alls "corporate critical" techno-igns of the company of the company of section of

One example of shared in AI, where CDC is att is in A.I., where U.A. in authorous and develop generic shells for expert sys-tems that can be customized to the R&D needs of each business unit. At this point, most of the efforts in AI and the other technologies are target-ed at internal use as development aids, not marketable products.

## DEC charged in \$6M lawsuit

y James A. Mortis ATLANTA — An Atlanta-l imputer and software mark impany has filed a \$6 million gainst Digital Equipment Cor-

r Entry/invo-rare program.

addition, the suit charges the reneged on a promise to estale a special telephone response lin-dle processing problems result-ure and that ASO

(NCC), the m

cal to its own success.

The four technology areas identified by CDC are all jects of individual research pr





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#### An Wang reflects

eets. He said that in 35 wars he only twice feared ing out of business. The rot was during the initial, ntative year of operations, in the second was when mpugraphic Corp. can-ied an agreement to sell a

tem called Lineace.

"The worst time I can remember is May of 1904," he
said. "We had just broken \$1
million in nakes, and everybody was saying that once
you get to \$1 million in sales
the company is safe. A millien dollars was big business

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delegate he assume and an amount

phere's engi-studing: rapidable Power Systems or Power Centers are Fire Protection Syste see Type Air Conditional Vinesi Diesel General —I Centers

rs and IRM's earlier pur-ase of core memory tents from Wang. Wang

id he is suspicious of sor the negotiations and another inventor's legal action in con-nection with the core messo ry patents in the mid-1950s.

IBM eventually purchased the patents for \$500,000 in 1956 but retained \$100,000 1900 but recamed \$100,000 of that because of the litiga-tion. He said some of his su-picions dealt with whether IBM had a closer relationship

it claimed.

Now 66, Wang says he has no plans or desire to retire.

He also disputes reto disputes reports that disquishing of the title

tirement.

Wang, who subsequently rectained that title when the previous president. John Canningham, left the company in 1985, anyt that the day-to-day duties he surrendered to Canningham were printerly marketing duties. Be naintaine that he kept control of research, development.

#### Megadeal activity declines in first half of '86, report says

By Alen Alper
FRENCHTOWN, N.J. —
The total value of acquisitions and mergers in the information processing indusformation processing indus-try plummeted by 12% to \$1.87 billion during the first half of 1986, a result of the decline of so-called "mega-deals," according to merger

Group, Inc.

B its recently released report, the firm noted that the
number of megodeals
fined as sequentially of the
sequential value of the
post fire in value of the
post fire in the first half
1100 million of the total value
11.6 billion of the total value
of transactions during the

During the first half of 1985, when a record-setting \$2.1 billion worth of acquisi-

sons for the decline, Var Varga

oite the slowdown in tion activity, Varga d some informat on pro-

lines or acquisitions that jibe with the corporate strategy. The cash raised is being used to retire debt, finance other strategic acquisitions and stock repurchase plans added.

While acquisition-minded firms are becoming more se-lective in who they deal with, Varga suggested that there are still many compa-nies running around saying.

ting \$5 billion of last year."
There were 138 transactions during the first half of
1985, off 13% from the first
six months of 1985, the report noted. "While acquisitions accounted for 63% of
the transactions recorded in
the first half of 1986, divesti-

served.
The five megadeals in the first half of this year were Citicorp's acquisition of Quo-

Corp. (\$243.8 million); International Thompson Organisation Ltd.'s takeower of Cordura Corp. (\$200.7 million); Allen & Ca.'s leveraged buyout of Control Data Corp.'s Telestron unit (\$165 million); and U.S. West Co.'s purchase of Applied Communications, Inc. (\$107.5 million).



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... nts per share, compa ith a net loss of \$223,0 3 cents per share, in

lid Logic Sy

of \$16.6 mill with \$12.2 mil

vious year.
Profits were \$407,000, or 3 cents per share, compared with \$256,000, or 2 cents per

share, a year ago, the co ny said. Couvez Compeported net inco me of \$1.1

reported net income of \$1.1 million, or 8 cents per share, on revenue of \$10.7 million for the third quarter ended Sept. 30. This compares with a net loss of \$1.2 million, or 9 cents per share, on revenue of \$3.6 million in the like pe riod a year ag

Baron Data Systems an-nounced revenue for the sec-ond quarter ended Sept. 30 of \$13.6 million, 152% higher than the \$5.5 omn quarter ended Sep \$13.6 million, 152% than the \$5.5 million ed for the second qui hast year. Profits \$227,000, or 8 cer share, compared with \$287,000, or 14 cents per

d revenue for the d Sept. 30 of \$128.1 empared with \$35.6 on in the previous year to were \$5.5 million, or n, or 48

nue was \$35.6 m pared with \$30.8 a one year ago. Profits wer \$1.3 million, or 19 cents pe share, compared with a net loss of \$330,000, or 5 cents per share, in the like period a

of, Inc. a se for the second of lion, an incr se of 1269 ion in the like arter last year. Net loss as \$251,000, or 2 cents per with re, compar 3,000, or 12

Priam Corp. reported rev use for the first quarte ided Sept. 30 of \$27.3 mil on, compared with \$30.3 sillion in the previous year. he company recorded a net see of \$4.8 million, or 20 ith net income of \$245,000.

or 1 cent per share, a year Inc. reported net inc the first quarter end 30 of \$1 million, or with net income of \$655,000 or 5 cents per share, on reve nue of \$35.2 million reporte



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tough printers. The kinds of printers that go where the work is, and get the job done. Printers built to work three shifts a day-all week, all month, all year-and never take vacations, Printers so solid and durable you'd think they were drop-

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ere the frontier days of the softs industry, when you had umpteen hundred wend vying for a place in the sun.

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up setting forth with a disk and a prayer. Of those umpteen hundred, very few hav

stood the test of time. As one tell you that shoestring budgets and singleten you that shoeming tologies and single-package technology may have gotten us started but they aren't what made us grow into the McCommark & Dodge of today. A global com-pany offering a broad, integrated constellation

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M\*Cormack & Dodge

with not income of 000, or 6 cents per , on revenue of \$13.1 n in the comparable pe-

fl, inc. reported a loss of ,000, or 10 cents per , on revenue of \$72.1 as for the first quarter d Sept. 30. Tals com-swith a loss of \$2.8 mil-

## IBM Software

DB2: The smart way to get your data...

IBM's Database 2 (DB2) is a data base management system you can relate to. Fast enough to handle most production applications. Yet friendly enough to give users easy access to data.

In short, it's a smart way to manage business growth and change.

A Programmer's Delight Because it's a relational system,

DB2 is as simple to use as it is powerful.

Professional programmers can easily write production applications for DB2 environments.

With Structured Query Language (SQL)-a powerful and easy-to-use language-programmers can become more productive because they can concentrate on what they want to process, rather than on how to get the data. For example, one line of SOL can do the work of many lines of COBOL. And programmers can also be

more efficient because of all the supporting software IBM has developed: high level programming languages, program generators and extensive programming tools and aids.

#### A User's Dream

What's more, SQL is based on English, which means that users can easily access information in DB2 files, either directly or by means of products like Query Management

COMPUTER INDU



Beleaguered software di tributor First Seftwa Corp. has filed a reorganition plan with the U.S. Bar ruptcy Court in Massach setts in an attempt to emer from Chapter 11 of the U Bankruptcy Code.

\$1.4 million, and international Corp is owed \$1.2 million and the federal go has agreed to part

rited \$32.6 milies. Among the SR
ors are Letus ing
Corp., owed go
and Micropro me
Corp., which ing
fullion.

A research cooperative with 36 member companies, 80°C will receive initial funding of \$1.2 million from the povernment. The Department of Defense is providing \$1.1 million of the initial unds and National Science Demandation (NSP) is provid-

ing \$100,000. NSP will administer the agreement with the SEC. SEC companies provide \$15 million a year for research directed to the main. schnology. The program furishes more than half of all the funds going to universites for silicon-based semionductor research.

Calcomp Products, Inc. supplier of computer grap les products, has become pr of Lockhood Corp.'s Info mation Systems Gro

> Calcomp had been a unit of Sander Associates, Inc., which Lockheed acquired for 1.2 billion in August.

William P. Conlin, presient of Calcomp and a newly ected vice-president of ockheed, said Calcomp will ajoy autonomy of operame under ING.

Quantum Cerp., a manucturer of Winchester disk rives, has filed a motion in S. District Court in San see, Calif., requesting a ammary judgment on one aim in its patent infringeent suit filed this year

Quantum also has requested a preliminary injunction prohibiting further infringement. A hearing has been set for the 10

Serbus, Inc. announced ar agreement with Condition Maintenance Services, Inc. a wholly owned subsidiary of Condition, Inc., to offer as atlantwise service for Condition's IBM 4500 customer base. Sorbus, the largest maintainer of IBM computes

Sorbus, the largest mair tainer of IBM compute equipment, with specific expertise in the 4300 series; is expected to significantly expand Comdisco's service coverage for this product area. Barropean Interactive Mdia (EIM), counterpart t

and Polygram B.V. Interstional to spearhead the Eurpean development of so ware for the new compadisk interactive system. Byron Turner, former of rector of creative develo

ment in Europe for Activi sion, Inc., has been name president of EIM, which will be headquartered in London III. Lee Data Corp. an nounced that its board of di rectors has adopted a share

holder rights plan in whier rights to purchase Le Dac common stock will be distrituded as a dividend at the raof one right for each share common stock heid by sharholders of record ou Oct. 1986. The rights are aut matically part of the share currently outstanding arwill be traded with them. The shareholder right

plan is designed to help ma agement obtain fair as equal treatment for all L Data shareholders in the event of any proposed tak over of the company.

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Facility (OMF). So users can satisfy their own information needs without an recommen

Facility (QMF). So users can satisfy their own information needs without adding to the application development backlog. To assist users at every level, DB2 offers extensive online help screens.

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DB2 data is available to TSO, IMS and CICS users. DB2 was designed to take advantage of IBM's MVS and MVS/XA operating systems, and the multiprocessor architecture and large real storage on IBM systems.

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will think they're sitting at an expensive workstation.

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# **NEW PRODUCTS**

### Mac, PBX tied under joint development

A 18.2% M/wc. connection between Apple Computer, Inc's Marintah and Apple Computer, Inc's Marintah and Apple Computer, Inc's Marintah and Apple Computer, Inc's Marintah Apple Computer, Inc's Marintah Apple Computer, Inc Inc. Marintah Apple Computer of the Computer of th

each. Intalk, a communications program for the Macintosh from Palantir Software, Inc. of Houston, has been certified by Northern Telecom to work with the system. Intalk, priced at \$145, can operate up to 32 not keys identifying data services. The keys are displayed on the Macintosh screen and can be selected by clicking the screen and can be selected by clicking the

cording to a Northern Telecom issnan, a major benefit of the link is ility to connect the Macintosh to othsoury to connect the meanmant to ora-manufacturers' computer equipment, stomers can use Northern Telecom's mputer-to-PBX Interface to election's te with Digital Equipment Corp. mini-mputers through the PBX. Used in com-nation with the AILC and wet-Packard Co.'s Advanced Terminal occasior, the link will allow Macintosh

ntern.
In addition, Macintoph users can comunicate with IBM computers through
othern Telecom's protocol converter,
othern Telecom's protocol converter,
of the converter of the converter,
of the converter of the converter,
of the converter of

# Data base interface unveiled

BBJ Computers adds DEC DBMS link to generator

tem. Today suports fourth-generation forms creation and management, report writing and data access to EDE/VES as well as the automatic generation of EDE/VES relational tables directly from the Today active data dictionary. Also supported is optional lower level direct access to EDE/VES data through the system's native at

VMS data through the system's native al-perbraic language. According to the vendor, Today is a According to the vendor, Today is a According to the vendor, Today is a late of vendors and end users from the host operating system, is includes capabilities for multivension application tailoring, interactive end-user trailing, structured of administrative security functions for managing the application maintenance and enhancement process.

Today's product architecture is said to be access excited and data have management of the control of the contro

Software & Services/110 Microcomputers/121

#### Decision support software system said to ease combination of discrete data

There DEI Computer Bothware, loc. of cot version of ITS for IBM maintraness consistency of ITS for IBM maintraness consistency MCGE and MWY/TED.

TO It is decident respect software graymaining VAICHGE and WWY/TED.

TO ITS and the second of ITS for IBM maintraness consistency of the computer, advantage of the second of th

within any PLS modes or application, and screen-driver report generation are both now possible, the spokesman said. PCS reportedly uses business English syntax and can be command or mens driven. Basic modeling features include more than 180 precoded functions, user-defined functions, a report writer, three-dimensional color graphics, what if analysis, Monte Carlo elimilation and statistical.

# printf("Hello, world\n");

#### **NEW PRODUCTS/SOFTWARE & SERVICES**

#### SOFTWARE SERVICES

ne. has announced Basic laims Processing System ICPS), an on-line health

sometics, pricing and canadianacial history.

BCPS runs on the HewlettPackard Co. 3000 computer.
The standard system costs
\$57,000. The advanced system, which includes the
source code and can be cus-

Synergy, Suite 201, 16775 ddison Road, Dallas, Texas

al Systems Interna-il, Inc. has announced I/XP, a data set security act for IBM mainframe illations using the DOS/ Version 1 and VSE/SP

sets.

Alert/XP is priced at \$9,100 for a permanent li-cense or \$228 per month for a three-year renewable Hoense.

Goal Systems, 5455 N. High St., Columbus, Ohio 43214.

Harris Corp. has an-sunced that its ADA com-ler has been validated by e U.S. Department of De-nse and is available as part the Harris Ada Program-ing Support Environment

a symbolic debt

The HAPSE compiler also

my and error recovery techniques.

The HAPSE system is priced at \$50,000.

Harris, 2102 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

hris Software has an-ounced Dges/34, an on-line ocumentation generator for SM System/36 RPG II pro-

inserted as commented source directly into the RPG program or stored as a sepa-rate library member. The five documentation types available are lists, cross-reference lists, indent-

ed subroutine lists, indicator usage and screen images. Dgen costs \$295. Iris Software, P.O. Box 4594, Suite 219, 119 Broad-way, Chico, Calif. 95927.

SAS Institute, Inc. has ported its SAS System Ver-sion 5 to the Prime Comput-er, Inc. Prime 50 series run-Dgen/96 is said to analyze RPG program statements and create documentation that is

According to the vendor, SAS System Version 5 pro-vides Prime users with the ability to integrate data ma-nipulation and analysis with

of and planning as

trix programming.

New features to the soft-ware include five additional macro functions and the abil-ity to select the most effi-cient sort of data, either by the SAS System or by the

First-year corporate li-cease fees range from \$1,500 to \$8,000 for base SAS soft-ware. Application module prices range from \$750 to \$5,000 each. SAS Institute, Box 8000, ns devel-is, opera-

NOVEMBER 3, 1966

SAS Circle, Cary, N.C. 27511.

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#### **NEW PRODUCTS/SOFTWARE & SERVICES**

Dyl-Audit, Sterling Soft-ware Dylakor Division's EDP suditing system, has been enhanced to include a two-up letter-writing capa-

bility.

Release 4.8 of the product is also said to enable users to generate reports and combined letters of up to a 260-char, width.

Additionally, an exit facil-ity has been added to the sys-tem that allows users to ac-cess the letter line prior to printing or to direct the letter

line to another device, the vendor said.

Dyl-Audit operates in ei-ther a free- or fixed-form lan-guage with the vendor's Dyl-280 II file and information handling system and with the report writer utility soft-ware systems Dyl-280 and Dul-260. Dyl-260. Release 4.8 of Dyl-Audit

Release 4.8 of Dyl-Audit costs \$21,800. Sterling Software, Dyla-kor Division, 17418 Chata-worth St., Granada Hills, Calif. 91344.

Applications packages

Primavera Systems, Inc. is announced Version 1.7 its Primavision piotter aphics software package. of its

ogic diagrams. clude an alternative place-ment algorithm for network logic diagrams; the ability to prepare summary bar charts

code or combination of up to five different activity codes; and the ability to plot the original target plan as a bar chart on which triangles de-mote the currently scheduled finish date or actual finish te for each activity Primavision costs \$1,500

Primavision costs \$1,500.

It runs on the Digital
Equipment Corp. VAX or under Microsoft Corp. MS-DOS
or IBM PC-DOS. Primavera Systems, Suite 925, Two Bala Plaza, Bala Cynwyd, Pa. 19004.

ems, Inc. has announ et, a cost me

its Vue project ma Vuecost is said to allow project budget planning and cost tracking.

cost tracking.

Pentures include the ability to set up account codes in
three different ways and to
provide full resource rate tables that feed the scheduling
portion of Vue to automatically calculate costs incurred

Vuecost also provides password-protected access to

Some reports provided are budget vs. plan, perfor-mance, earned value, profit-ability, breakdown and cucost graph, the vendor said

Vue project management is priced from \$996 to \$37,000. The Vuecost module costs from \$1,795 to \$14,000. National Information Sys-tems, 20370 Town Center Cupertino, Calif

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Introducing IRC/IRES. An advanced 4/G, DBMS that well worth a closer look.

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PECCEPS is available for the \* SM PC, 15, FL and comps • Surgary • SM, eV, Elling • SC3 Source • Microsoft ESMC • Surgary • SMS, • and source, Cut for a district for

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The DBMS that gives "fast" a whole new meaning.		
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ning Rd., Billerica, MA 01521

CIFI (S

Associates has an displayed docu-

Remidee automated docu-mentation package, designed especially for IBM System/36 Cobol users.
Added features include simulated printer layouts from Cobol source code.
Cobol users will be able to include source and procedure citizen as part of the Remidee Culture of the Company of the culture of the Company of the the Company of the C

Other features include reports showing file usage, sys-tem flowcharts and field giossaries as well as menu and screen layouts.

Remdoc is priced \$1,250 REM Associates, P.O. Box 527, Village Station, New York, N.Y. 10014.

#### Languages

Lattice, Inc. has announced the Lattice VAX to MS-DOS C Cross Complier, Version 3.1 for Digital Equipment Corp.'s VAX/730 systems running VMS, Unix and University of California and University of California
at Berkeley Unix Version 4.2.
The cross-compiler allows
users to take advantage of
the larger system's speed and
multiuser capabilities to creste applications for most Mirosoft Corp. MS-DOS per-

onal computers. Version 3.1 includes ex-Version 3.1 includes ex-panded M8-DoS libraries, case sensitivity with exter-nal symbols, enhanced capa-bilities for generating debug-ging information and added features to the LC command. The Lattice VAX to MS-DOS C Cross Compiler Version 3.1 including linker

costs \$5,000. Lattice, P.O. Box 3072, Gien Ellyn, Ill. 60138.

# wiett-Packard Co. has an-nd the HP C/XL C language ler for its HP 3000 900 business

complete for its IF 3000 900 business computers.

The C compiler is said to be compatible with the portable Compiler standard from ATAT and with the proposed ANSI C compiler standard. It is also compatible with C compiler carries that symbolic debug and optimizer support and gives account to all floatines of the IF 3000 sessingergramming executive

operating system.

The HP C/KL compiler is priced at \$7,000.

Hewlett-Packard, 1820 Fasherer.

Hewlett-Packard, 1820 Embar dero Road, Palo Alto, Calif. 94303.

Hewlett-Packard Co. has an-



#### **Bridge the** spreadsheet p with ESS.

With some mainframe spread-sheets, it can be difficult if not impossible to get across to Lotu 1-2-3 and back, but with ESS

it's easy.

ESS speaks the language. It reads the actual Lotus worksheet files (WKS) to insure accuracy and complete transfer of data. It has a similar command structure for effortiess learning, And it successfully bridges the gap to other micro spreadsheets as well.

That's more than other mainfra ets can say. What is more, ESS offers "3-D" spreadsheets of unti-cost savings. mited size and

New: ESS now for CICS and ADR/ROSCOE. Call Trax Softworks, Inc. today. (213) 475-8729

[215] 475-8729 In use at handreds of companies world wide, ESS russ on IBM and companies maintranes under MYSTSO, MYSTAN VM-CAS, CKS-IDOS & OS), ADRIV MSCAS, CKS-IDOS & OS), ADRIV TELLA-GRAF inter-tace Committee Committee Committee World Processing Trax Bran Softworks, Inc., 10801 Nette Brvd . Los Angeles, CA 90064

nounced an enhanced logic program-ming language called BP Prolog for use with its BP 9000 Model 320 tech-

nical workstation.

According to the vendor, users of
the Model 320 workstation will be
able to alternate between the Prolog
and Common LESP languages and in-termity code. They will also have access to other programming languages, such as G, Pascal and

Prolog is an enhanced version Prolog. It supports Edinburgh C-log syntax, allowing the importa-n of existing Prolog code.

ton of existing Prolog code.

As a stand-alone system, HP Prong costs \$4,000. A Prolog developnest system will be added to the
fold=300 AI development workstions for a price increment of \$4,000.

Rewlett-Packard, 1820 Bmbercatero Boad, Palo Alto, Calif. 94303.

Structured Technology Corp. has mounced Super Search, an inquiry-merator system for Tem Speed-lated applications on the Wang Lab-atories, Inc. 2000 and compatible

sic 2C.

Saper Search provides the ability
to develop and maintain specialised
inquiry acress and indices for any
Speed-I file within the system. Posdriver, the ability to search files aiphabetically based on one character
and the ability to paint a display insage for each inquiry.

Super Search costs 31,205.

Super Search costs 31,205.

Whiteland Technology, 2540
Whiteland Technology, 05518.

date, the software division tek Corp., has announced the regulate User Interface Mus-t System for the Digital ent Corp. VAX computer run-

where the property of the prop

abroutine system. Blox/Template is priced from San Diego, Calif. 92121.

Intermetries, Inc. has announced the Batch Scheduler System, a Unitable Methods of the Parket Methods of the Parket Methods of the Scheduler Sched

Batch is said to run on Sun Micro-systems, Inc.'s Sun-2s, Sun-3s and any Digital Equipment Corp. VAX running Unix 4.2 or 4.3.

Batch is licensed for \$1,000. Intermetrics, Inc., 733 Concord ive., Cambridge, Mans. 02136.

Flevour Technology, Inc. has accessed its VAL Symbolism Base Engineers Carp. VAL comparison of the Engineers Carp. VAL comparison of the Symbolism. Inc. 2000 family of artificial incline factors and the Symbolism. Inc. 2000 family of artificial incline factors and the Symbolism of AL Table and Engineers (A) and the Symbolism of the Symbolism of

the VAX/Symbolics Bus-Link is priced at \$18,000. Playors Technology, 10 Northern Bivd., Amherst, N.H. 09031.

Realis, Inc. has announced preemie, a panel definition and reen management facility for Rereen me

atla Cobol.

Screenio is a subrouting that man special color in the subrouting that man special color in the subrouting that man special color in the subroutine subr

Legical Devices, Inc. has an-councid Computer Astemated Billi-osite for configuring programmable ogic devices to designers' logic cir-vait equivalent. Peatures include the ability to do

tput results.

CAST uses a proprietary logic reminimization algorithm, the

Two methods of design entry in-cluded are truth table-state table en-try and Boolean logic/state equation The CAST basic package is priced

180 Devices library updates costs 1800 Device library updates cost from \$50 to \$100 Logical Devices, 1321 N.W. 66th Place, Port Lauderdale, Fis. 33309.

Bakhwa and Associates has an-mounced Baksman, a translator parkage that converts BM System/ 34 or System/98 EPG II to main-frame-compatible Cobol. The translator reads in RPG II and-produces ANSI Cobol for IBM OS/ MVS-type systems, according to the

The on-line programs are translated to be IBM CICS command level programs.
The basic translator costs \$12,900

for a lifetime license. Bakken and Associates, 2666 Ce-dar Creek Road, Jackson, Wis. 53037.

Outlook Software, Inc. has announced the Outlook Report Witter for the IMS System/38.

According to the vander, the Outlook Esport Writer is an ascemble-based product that provides access to the System/36 data base.

Information from up to 15 files can

information from up to 10 sums can be accessed at once.

The information can then be ma-nipulsted and output in the form or reports, or-line displays, graphs and file interfaces, according to the vec-

Peatures include use of up to 100 fields, full election criteria when ac-cessing file information and job

streaming.
The Outlook Report Writer costs \$5,500. Outlook Software, Suite 117, 1 Woodfield Lake, Schaumburg, Ill. 60195.



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rding to the vendor, it is the information ing professional with nework for integrat-project within a range and business issues

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It is priced at \$496. The Productivity Group, ite 32 S., 305 W. 98th St., w York, N.Y. 10025.

#### MICROS

#### Systems

nced the Form-station, an IBM mouter AT-based

The Formcoder Worksta-tion employs a graphics tab-let and stylus.

Description of the styles of the lasts generated by software packages such as Lotus De-relegement Copp. 1-2-3 with electronically stored forms to

The Formcoder inc 84- by 11-in. Formv an 84-by 11-in. Pormaviewer 2 monitor with a graphics display unit, adapter card, software and business forms forth package, graphics tablet and stylus, 1880 Personal Editor and a Fornaviewer 2 Display System. Formooder in priced at 47,760, not including the AT. Electronic Form Systems, 2396 Midway Boad, Carroliton, Texas 75006.

# Series/1

Megatek Corp. has intro-ced the 911 Graphics En-a personal computer-

previewing of shaded ob-jects. The graphics display system includes is frame buffer that is composed of two 24-bit, 512K- by 512K-byte buffers, an 8-bit, 512K-

It provides a switch-selec-table 6- and 8-MHz CPU. Op-tions include 640K bytes of

ternal streaming tape back b, 2,400 bit/sec. modern id 80- and 132-col. printer

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IBM Software Authorities

ore system incrusors a cill-and-ell-lin. monochrome monitor, -byte hard disk, 1.2M-byte flop-drive, 512K bytes of random-ac-memory (RAM), a serial and a allel port and a clock/calendar. coperates at 6 kHz or 8 MHz, sup-abeth text and graphics and fea-ments of the control of the control at the control of the control



198 Programmer.
The Box-Er comes with a key-board, a color monitor, two 54-in. dual-speed disk drives and one 20M-

The unit, including MS-DOS soft-ware, costs \$5,995. Zax, 2572 White Road, Irvine, Calif. 92714.

a coser/secouer.

A typical workstation is pr
\$5,900. A system of 10 Visi
workstations, including an in
board, is priced at \$69,000.
Videotelecom, 11002-B
Blvd., Austin, Texas 78758.

Kamerman Labs, Inc. has introduced its Walt-Less XT fixed-disk computer system.

The system uses intel Corp. 8086-116-bit technology to achieve 10-MHz

10-bit technology to actuave 10-bit.

It includes 768k bytes of random-access memory, a 20th-byte fixed disk, floppy drive, IBM Personal Computer AT-style keyboard and an 1/O card with clock, serial and parallel ports and floppy controlled ports and flopy controlled.

The Wait-Less XT is priced \$1,000.

rman Labs, 7861 S.W. Cirrus

rp. has and

nalysis system.

The QX-7 includes a Quante gned plug-in coprocessor bosses PC AT.

It provides the interface between ne personal computer and the Versa-us chassis containing Quantex's im-

sele containing Quanter's im-cessing hardware. res include the ability to ically control the best RS-170 and digitize, average, back-subtract and edge-enhance

antex, 252 N. Wolfs Road, Su ie, Calif. 94086.

oftware applica packages

Righ Screen, a screen generator for the IBM Personal Computer XT, PC

Our text management and retrieval systems serve text the serves data.



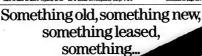
From raw.



To refined.

compile matery of information. That's very loss Retrieval, a radioal leader in test processing, extrieval, and type composition service and softwar, is the first to offer capability this comprehensive. Cell Data Retrieval. Let's discuss a TextDSAS for your special biened of information. Let's table. Cell 414-335-5900.





Continued from page 123
tion 7 Plan color graphics
arminal emulation software.
The program in said to emlate Hewlett-Packard ess memory and I color monitor. It is HP's 2392, Dig-pment Corp.'s

graphics terminals.

Reflection 7 also features
a built-in hard-disk backup

n 7 costs \$499 Walker Richer & Qu 125 Eastlake Ave. E., S b. Wash. 96102.

ZBert. Corp. has intro-duçed PC Painthreath +, a drawing and painting pro-gram said to feature support leave principal properties. The Features include the abit-Pastures include the abit-plex monitors. The properties of the result of the properties of the pro-tokes, flap, draw with this or thick lines, draw boxes and rounded boxes, drules, edipose, curves, peray paint works in black-and-white or color.

down menus to control contrast, brightness, ning resolution and gray

PC Paintbrush+ at \$149.
23oft, Suite A-495, 1960
wirum Circle, Marietta,

Text Sciences Corp. has announced Infobank, a text search and retrieval program for the legal profession. Infobank is said to brewest and search ASCII files using care has a pecify the common Boolean operators along with wild card, proximity, case and punctuation rules. Infobank features an interpretable text respecting facility.

dity.

The program runs on IBM
Personal Computers and
compatibles. It is priced at ices, 5340 San pad, Glendale,

Microbar Development Corp. has announced Shops-can, its personal computer-based shop floor data collection software package.
Shopsean supports Internec Corp.'s Crossbar Data Collection Network. It can be either a stand-alone system or a combination front-end processor and data communi-

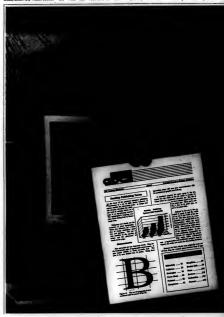
acced its Cyma Professional Accounting Series software for use on IBM Personal Computers.

The software is said to allow the user to define data file formats to series and the series of the software in the software in the series of the seri ser to define data ts to store desired e. Many reports ble, and all screen

ang utilities. he series consists of Gen-Ledger for \$795, Ac-ts Receivable for \$695, sunts Payable for \$695, roll for \$695, Inventory Order Processing and Accounts Receivable to \$6
Accounts Payable for \$6
Payroll for \$665, Invent
with Order Possing
Sales Analysis for \$995
weltiuser module

Cyma-McGraw/Hill, P.O. Box 4122, Mens. Ariz. 85201.

Data Translation, Inc. has introduced the Sangabot Sterneys Seepe data acquisition software package. The software package. The software is said to al-The software is said to al-The software is said to al-The software is soldered at the software of the software is soldered at the software in the software in the soldered in the software is sometime to some endine software in the so



Tra Drive, Mariboro, Mass.

PSS, Inc. has announced Cold Caller, a personal com-puter software product for contacting sales prospects by

Cold Caller allows sales

PC so that prospects can be lings and by phone

Telephone calls are automati-cally dialed and customized scripts presented for the rep-resentative to use. Each call

sentative to un-merates a report. Cold Caller runs on an IBM trisonal Computer. It costs 305 including software, di-ding hardware, telephone cadact and user guide.

PSS, 165 W. Pr nam Ave.,

ssentatives to set up and Greenwich, Cosm. 06830. age their territories on a

Generated Systems, Inc. has announced Taxfiler, said to enable employers to meet federal requirements that

federal requirements that make it mandatory for orga-nizations with more than 600 employees to report 1865 wage data to the federal gov-erument on magnetic media. Taxfiler is said to meet 1985's federal wage reportnts by pro

ing such data on 5¼-in. mi-crocomputer diskettes. Wheaton, Ill. 60187. ocomputer diskettes. Data may be input to Tax-

filer either through the use of menu-driven input screens or through the use of its

Taxfiler also enables the user to print W2 forms and produce audit reports. It runs on any IBM-compatible mi

ocomputer. Taxfiler is priced at \$250, cording to the vendor.

rated Systems, Suite

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#### Now, desktop publishing software of such genius. you don't have to be a'Leonardo' to use it.

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Chapur	TELL .
annes .	dir

THE STREET STREET, STR

ne. has introduced its Type-occumum integrated ac-

ng system. em is said to give

ng functions. inting summing specialized fea-ires for typesetters of all zes, including an integrated lectronic time clock for pay-tracking and report-

roll, job tracking and repo ing, departmental break-down of data and customized

The system is available: ingle-user and multius onfigurations. It is price rom \$2,000.

McDonnell-Nabi Systems, Suite 3, 991 Commercial St., Palo Alto, Calif. 94303.

Cpaids, Inc. has a ounced an Internal Revens Service electronic filing op-tion for its Master Tax and

Standard Tax programs.

The IRS filing options in conjunction w The IRS Illing option with the federal tax programs to transmit tax return data from the tax preparer's microscomputer to IRS computers using communications and tware and moderns.

The Opalds IRS electronic filling option is priced at

filing option is priced at \$200, according to the ven-

Cpaids, 1061 Frater Circle, Kent, Ohio 44240.

Software languages Taneco Systems, Inc. has mounced TSCOB, a Level 2

Cobol compiler for the IBM Personal Computer and com-TSCOB is said to cover all modules: nucleus, table han-dling, sequential I/O, relative I/O, indexed I/O, sort-merge, segmentation, communica-tion, library, interprogram

communciation, report writ-ing, symbolic debugging and screen handling. TSCOB is available for use nder IBM PC-DOS and Microsoft Corp. MS-DOS en

It is priced at \$145, which includes an indexed file man-agement system, according to Taneco Systems, Suite K, 17461 Irvine Blvd., Tustin.

Apple Computer, Inc. has announced an enhanced version of its interpreted programming ianguage, Macin-tosh Pascal 2.1.

Macintosh Pascal Version

2.1 features instant feed-back, interactive debugging tools and multiple windows. It also includes the ability to

te programs as large as 0 lines, a runtime shell developing stand-alone

h Pascal is said to

s to observe and ages to variables, a and graphics as

am runs.

allows users to inogram statements
cally, highlight key
d send output from
h Pascal 2.1 to eior printer files, acthe vendor.
toth Pascal 2.1 costs

Software utilities

VSCOM is priced at \$395, deding PC terminal emula-n and document and file ransfer software.

The Wang VS Transitility costs \$495 per VS.

The PC Terminal Emm costs \$195, according a vendor.

oup, 222 W. Ad do, III, 60606.

tputs into a file, so unat-neded execution of proce-ures and delayed file re-ews for verification of per execution are po

ble.
Attach is priced at \$150, the vendor said.
Intercontinental Microsystems, 4015 Leaverton Court, Anaheim, Calif. 92807.

Pajac Systems, Inc. has anounced The Key, a soft-

Pajac Systems, 114 Wal-

ding to the vendor, can write to any whether it appears

101, 1411 LeMay Drive, Car-rollton, Texas 75007.

Now PCs on your LANs can talk to your mainframe as easily as they talk to each other.

uncy units to death other:

This shoot resource tharting, all states is one POLX
Gateneys to defiver fall maintiname privileges to all the POL on a LAN.
And slike about resource smith
A POLX Gateneys can serve you ask linked or moderns, controllers, terminal emulations and line costs.

John Committee of the Com

talk to the main-frame, using software alone. In fact, PCs can talk through more than a sing PCOX Gateway.

PCOX Caleways
on a LAN. Then they can carry out
3278/79 emulation, 3270 PC emulation, send-receive file transfers,
or even 3257 bost printer emulation
with their PC printers.

PCOK Geteweys work in all NET BIOS-competible LANs, including IBMs own tokes Ring and PC Network plus LANs from AST ATST, Noveli, Sytek, Ungermann-Bass and others.



sarian. The soft-les tools for de-nos and graphics Prications.

The C-Display Compiler The C-Display Compiler costs \$125. The Demoexpress Viewer costs \$29 and the C-Display Librarian, \$145. Sydetech, Suite 17C, 43-23 Colden St., Flushing, N.Y.

package is said to allow users to access file management ca-pabilities from within a rundisk optimization.

Pestures include the ability to copy or move files or entire subdirectories and formore would be subdirectories and formore would be subdirectories.

mat or copy diskettes, the vendor said. Power Tools also give users the ability to view, edit or

print any file or sector and locate any file or string on a

disk.
Additional features provide user with the ability to delete files and subdirectories, verify files or disks, map disk usage, and restore data erased or deleted by accident, according to the vendent, according to the vendent.

Power Tools is priced st. MLI Nic Framing

Bay Computer Corp. has introduced Bay Utility, soft-ware said to allow users to automatically track which

software programs are bein ed on a pe within an orga cording to the ver software program on a per-sonal computer, the Bay Util-ity software will create a re-

cord of the name of the software file being accessed, the time and date of the ac-

of that program. Bay Utility also includes a nu-driven program that the user to combine, t, summarize and organize data collected and prethe data collected and pre-sent the data in management reports. The data can also be exported to Ashton-Tate's Dbase, Lotus Development Corp.'s 1-2-3 and other appli-Corp.'s 1-2-3 and owner appro-cations packages.

The Bay Utility costs \$99.95.

Bay Computer, York and Haverhill Streets, Andover,

Mass. 01810.

PCOX/GATEWAY COAX con-nects directly to a 3274 cluster controller, and supports up to five concurrent host sessions. In fact, you can even make a PCOX Gateway Coex out of your existing IRMA\*

board.
PCOX/GATEWAY-16 and
PCOX/GATEWAY-64 each connect
to a mainframe communication
controller over modems and phone lines, and support up to 16 or 64

host sessions. You can also put any number of PCOX Gateways on any size LAN, and control access to the mainframe through configuration and

security features built into the security resurres built into the gateway itself. POOX Gateways are products of POOX Technology, a modular system of advanced micro-to-mainframe connections. name connections that helps are PC demands for maintrame

access.

And PODX Gateways are at the top of the PODX product migration path. Which means all you need is software to turn any existing PODX micro-to-mainframe link-coax or remote-into a PODX Gateway.

So find out how PODX Technol-

ogy can help connect any number of micros to your mainframe. Call

now for more information about POOX Gateways. And ask for the name of your nearest CXI distribu 800-225-PC0X

In California, call 415-424-0700.

CXI, Inc., 3606 West Bayshore Road Palo Alto, CA 94303 Telex: 821945

Articulated Systems, Inc. s announced Art-4, an inseous report and es display module for conjunction with the se in conjunctio

ware.

Art 4 is said to be a personal computer system fea-turing instantaneous display of key Items. It starts auto-matically when the personal computer is turned on and computer is turned on and presents the most frequently required or important items to the user. It interfaces with Lotus Development Corp.'s 1-2-3 as well as other spread-sheet and graphics applica-

Art-4 is priced at \$300. Articulated Systems, ngton Ave., Farming-onn 05032

larget Software, Inc. has ounced Vella, a deak ac-sory outliner for the Ap-Computer, Inc. Macin-

tosh. Wella is said to run over most Macintosh software. It features untimited numbers of headlines, subheads and expanders. Users may individually edit fonta, sizes, styles, margins, text alignment and line spacing within each expander window. Peatures include the ability to edit fonts and styles within edit fonts and styles within individual headlines and sub-

Volla is compatible with Appie's Laserwriter and Ima gewriter printers. It runs on a Macintosh 512K or Macintosh Plus. It costs \$99.95. Target Software, 14206 S.W. 136th St., Miami, Fla. 33186.

.

S&S Systems has intro-duced Quik/BMS, an IBM CICS screen development Quik/BMS runs on a per-

Quik/BMS runs on a per-sonal computer and automat-ically generates the BMS macro source code for use on a mainframe computer. It is said to allow users to design and paint CICS screens on a personal computer without the coding of BMS macros. The screens can be reviewed and modified.

res inch ode a full



170 format.
Users may also key data
to the screen's input fields
r testing purposes and
wraload existing maintime BMS macro source
de to the personal computaccording to the vendor.
Quik/BMS is priced at
96.

P.O. Box

Calcomp has introduced Batchplot, software said to allow users of Autodesk, Inc.'s Autocad computer-aided design software to plot up to 60 drawings in a single batch run on a Calcomp 1042GT or 1044GT pen plot-

and the plotter can be left un-attended during the entire batch plotter, according to the vendor. Batchplot is offered as an option with the Calcomp plotters it supports. It costs

\$200. Calcomp, P.O. Bex 3250, Anaheim, Calif. 92803.

graphical material and al-lows merging graphics with text during printing.
Turbofonts is compatible with word processing pro-grams such as Microsoft Corp. Word, IBM Volkswiter and Wordperfect Corp. scientific symbols and for-eign languages to be seen on the screen and printed from within word processing soft-ware programs for the IBM Personal Computer and com-

Corp., word, 15M voicewriter and Wordperfect. Corp. Wordperfect. Turbofosts costs \$149. Image Processing Soft-ware, P.O. Box 5016, 4414 Regent St., Madison, Wis. 53705. Turbofonts is memory res-ent. It controls the key-sard, screen and printer and lows the user a choice of one than 30 different char-ter sets or complete custo-isation from a library of one than 1,600 characters. Turbofonts also captures

Template Techniques, e. has introduced Work-pw Manager, a software mplate disk for performing oject management with Lo-us Development Corp.'s 1-2-

According to the vendor, the template is designed for professionals working with time, budget and manpower schedule tasks, plan staff seignments, estimate costs and track progress within the Lotus format. Additionally, the single software disk can be utilized for reporting atoms and for forecasting final cost and end date.

Features include on-screen bar charting, resource and cost data base and Help key. It runs on an IBM Person. The Workflow manager costs \$69.96. Tempiste Techniques, Suite 102, 16747 Squyres Road, Spring, Texas 77379.

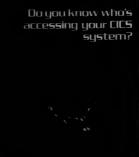
Softplus, Inc. has intro-duced Menu Pienze, a menu management system de-signed to establish a stan-dard menu interface for any application running on Wang Laboratories, Inc. VS sys-

tems.

Menu Please features the
shility to modify or restrict
menus on-line without interrupting usage, the shility to
set usage constants and a beginning and ending procedure for menu estries; hidden program function keys;
three modes of operation;
and the shility to define or
restrict menu entries by
groups of users and workstations.

Wang VS Cobol source code is provided to allow us-ers to customize Henu Please to conform to existing sys-tems and standards. Menu Please costs \$295. Softplus, 79 President St., Brooklyn, N.T. 11231.

neering Controls sologies, Inc. has an-ed Real Tools, a set of product development and C furnition



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Bdward P. DiMingo Director Corporation Communications Intotron Systems Cherry Hill. NJ



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product, the InfoStream" 1500 11 voice and data multiplem he chose Computerworld as the major vehicle for getting the message to the right peotic — network managers, rolce and data managers, and MIS/DP directors.



zid explaints just how he known hele message is being read. 71 put logsther a list of data communications buyers and mighencours. And for the past heppowar. Ne policed these people to find out what they read not Computerworld always loads the way. It fact, in the most read skip. Computerworld come in very above the other at 64% with Darkmotion of 51% and Botta Communications at 25%.

In fact, Ed's own readership studies were reinforced by rerulls of a recent Starch study. "Our InfoStream ad ranked in the top 10 percentile for 'read most' among all advertise-



ments studied in the issue.

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Miles registered trademark of International Dogices Machines Corporation, DEC is a registered trademark of Digital Equipment Corporation.

Continued from page 128 windowing capabilities, user-defined graphics and assort-ed utilities and library func-

screens, windows, graphical symbols, bar graphs and text are defined and created by

Real Tools costs \$99 for bi sry, \$299 for library source and \$399 for complete

It is available for AT&T's Unix System V, Santa Cruz

Operations, Inc. Xenix, Mi-crosoft Corp. Xenix and IBM Xenix. It can be ported to other Unix-like systems. C programming language. The DES was developed at IBM for the National Bureau of Standards and is an out-

Standards and is an out Pioneering Controls Tech-nologies, Suite 300, 510 Ber-ing Drive, Houston, Texas DES enciphers 64-bit scks of data with 56-bit DES

Abracadata Ltd. has an-nounced Welcome, an elec-tronic handbook tool for the

The source code is priced \*\* \$25

Software data base

management systems

ome is a data base in plication library, Plic DES can be redistri without royalties.

Michael Flinder & Associates, 169 Burnside, Tona-wanda, N.Y. 14150.

Welcome is a data base in-cluding both text and graph-ics. It enables users to pro-vide and update information for other users. It includes file types for directories, phone lists, mailing lists, job titles and functions, interreionships, organizati story, goals, emerge ocedures, business pl entation safety/bene-

Apple Computer, Inc. II se

ble category.

The graphic file types intude building, lot, parking
t, conference, location map. plan, organizational struc-ture, flow chart and a user-

Welcome is p is priced \$79.95 P.O. 2352, Eugene, Ore. 97402.

hanced its Revelation micro-computer applications develbilities that allow the

rsonal computer environ-nts created by use of Anex Technology, Inc.'s Multi-PC, Multi-AT and PC Annex ex-pansion systems.

This is achieved via a mp disk that accommodates the operating require-ments of up to four users on a

ments of up to four users on a multiuser system. Revelation reportedly fea-tures standard data base management system func-tions as well as a program-ing language, compiler, text editor for writing source code and a line editor. The product also features a debusers ruporarm formats

a debugger, program format-ting and listing function, guage and report generator the vendor said.

Additional functions in

Additional functions in-ude a menu generator, interfaces to microcomputer local-area networks

Each bump disk costs The single-user version of Revelation costs \$960, ac-cording to the vendor. Cosmos, 19530 Pacific Highway S., Seattle, Wash.

## Software enhancements

Northwest Analytical, Inc. has announced Version
4.1 of its NWA Statpak statistics package for IBM Personal Computers and compa-

The software is said to provide users with presentation-quality graphics, en-hanced data management ca-pabilities and added

nalytical functions.

NWA Statpak sells for \$495 per copy, according to the vendor. Northwest Analytical, 520 Davis, Portland, Ore.

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go, and so do their products With Renex you won't get stuck with just a bunch of PC boards or boxes. You'll get the kind of continuing we provide a total line of protocol conversion prod-ucts to interface your ASCII equipment with IBM. All the way from coax or twin

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OPENING NEW LINES OF COMMUNICATIONS

Inc. has eraion 2.0.

Menu is a menu system : se control of an IBM Person, PC XT. PC AT or comp em. It consists of two pr is written in assembly language user builds the menu system

e user builds the menu system the asparate menu-driven editor. Features include the ability to at-th passwords to any entry on any nu screen, format choices of black is white or color, foreground, back-und and border colors, date and se display and menu character s. Magic Henu also has an audit all option and a peripheral control orther.

Menu is priced at \$99 for a sion and \$500 per file serv-network version. sft, P.O. Box 1360, Mel-

nan Software has an-eraion 2 of its GPSS/PC nt software for nal Com

GSS/PC Version 2 includes anima n and five additional interactive aphics windows. It includes sup rt for a pointing device, a session irmal, a results data base and a ilt-in analysis-of-variance com-und for a first-level statistical anal-

GPSS/PC is priced at \$995.
Minuteman Software, P.O. Box
171, Stowe, Mass. 01775.

Softest, Inc. has announced the Softype Desktop Publishing Softwars, Richaes 4.0.
Softype is available for a range of computers including IBM Personal Computers and compatibles as well as systems based on Units and Microsoft Corp's Xenix. Belease 4.0 feather of the Corp's Xenix. Release 4.0 feather of the Corp's Xenix Release 4.0 feather of the Corp of the

control, control of letter spacing and the ability to size graphic images. Softype 4.0 also includes laser printer drivers for Bewlett-Packard Co.'s Laserjet and Laserjet Plus, Canon U.S.A., Inc.'s Al1/A2, Quadram Cosp.'s Quadlaser printers as well as Xerox Corp.'s 4046, imagen and Post-

script language printers.
Softype transforms the formatting information within a standard word processing document into appropri-

softype is priced at \$1,000 for sin-gle-user and \$1,500 for multiuser

systems.
Softest, 555 Goffle Road, Ridge-wood, N.J. 07450.

Micro Education Corp. of America has announced Version 3.0 of Andrew Tobias's Managing Your Money, for IBM Personal Computers and

computibles. Added capabilities include the ability for the user to adopt whichever tax changes are necessary; home banking in conjunction with Chase Michinatian Black N.A., a notequal said Michinatian Black N.A., a notequal said program, a more detailed manual, jurceased speed, simpler handling of prepayments and variable charges for mortgage lossns, the ability to store multiple restaf property and the said of the said o

d report. t Version 3.0 is

Instant-C 2.0, an incremen-lier for the C language said as only the parts of a proresoft Corp. has annous a 3.0 of Project, its pr

g and tracking sche and costs. Users of Ve

ided features include net-ort, an activity list report

ent Corp.'s 1-2-3 for-of Managing Your 8-96. Microsoft Project Project 4 \$395. Microsoft Corp., B. ion Corp. of America, N.E. 36th Way, Be mat.
Version 3.0 of Managing Tour
Money costs \$199.95.
Micro Education Corp. of America,
285 Riverside Ave., Westport, Conn.
98073. ft Corp., Box 97017, 16011 Way, Redmond, Wash.

Rational Systems Natick, Mass. 01760. es the in

es to

a run-time checker.

Peatures Include full 640K-byte capacity; support for linking Lattice, Inc. Versions 2.0 and 3.0 and Microsoft Corp. 3.0 object code and libraries; and the ability to handle hardware interrupts in C.

Instant-C 2.0 runs on IBM Personal

patibles and costs

Adapt SNA 3270 emulates an IBM 3274 controller equipped with a 3278/9 terminal and a 3287 printer, allowing PC-to-mainframe communi-cations in IBM Systems Network Ar-

ltecture environ

It operates over leased, point-to-point and multidrop lines at speeds of up to 9.6K bit/sec. A software-only version costs A hardware and software

ge carries a price tag of \$830, includes an Adapteom Syn-tus Data Link Control adapter

A hardware/software package in-cluding a 2,400 bit/sec. modem costs \$1,380, and a hardware/software package including a 4.8K bit/sec. mo-dem costs \$1,780. Network 22982 Mill Creek, Laguna Hills, Calif 92653.

allenger Software has released on 2.0 of its MacSD two- and

an. Among the additions to the pa-pe are lighting and shading capab-es, the ability to create custom to ad to switch between sets of to ad the ability to make any two-tours.

nal object into a three-dimen

ge viewing modes, and export and port capabilities for communicarge viewing modes, and export and uport capabilities for communica on with other graphics programs. MacSD is priced at \$195. Regis-red users of previous versions can grade for \$30.

nger Software, 18350 Ked-

zie Ave., Homewood, Ill. 60430.

Nantocket Corp. has announced the release of the Astama '86 ver sion of its Clipper compiler for Ash ton-Tate's Dosse III and Dosse II

Autumn '86 is said to produce both single-user and networking applica tions. It supports Microsoft Corp. MS DOS 3.1 calls for networking func DOS 3.1 calls for networking func-tions, allowing compiled applications to run on networks such as IBM's To-ken-Ring, Novell, inc 's Advanced Netware and 30om Corp's 3+ Net-work Operating System. The compil-er also supports the Lotus/Intel/Mi-crosoft Expanded Memory

date to the new version for \$139. Nantucket, 5096 Sepulveda Bivd., Culver City, Calif. 90230.

System Facilities, Inc. has an-nounced Version 5.91 of its XPIP in-tegrated system utility for Microsoft Corp. MS-DOS, IBM PC-DOS and No-

il, Inc. Netware systems. XPIP is said to be a DOS shell and XPIP is said to be a DUS shell and disk manager. The latest version of XPIP includes a sort utility support-ing record selection and sorting on multiple keys, a user-definable menu facility for quick and easy access to any user applications and a 73-page

anual. The price of XPIP is \$29.95 plus \$3 shipping. System Facilities, P.O. Box 7079, Charlottesville, Va. 22906.

#### Communications

Advanced Digital Information
Corp. has announced its Model \$82, a 4-in. cartridge tage subsystem designed for use with local-area members operating with Novecl. Inc.
3.1 MS-Net software.
The Model \$52 is said to provide a starting formaticated tape capacity of \$7M bytes.
It acts as the host

of bytes.

It acts as the host drive to which
iree of the vendor's modem 530 tape
cpansion subsystems can be daisyhained for up to 268M bytes of on-

line network tape storage.

The tape emulates a disk drive and provides random-access file addres-DOS commands work to and from

the tape drive, the vendor said.
The Model 532 costs \$3,490.
Advanced Digital Information,
P.O. Box 2996, Redmond, Wash.

MBP Software and Systems Tech-nology, Inc. has announced that its Visual Cobol Cobol compiler is com-patible with Novell, Inc's Netware

tem. Running under Netware, the compiler is said to create multiuses applications with full record-locking

nd file-locking support.
Visual Cobol for Novell Netware

costs \$1,450. Single-user versions for Microsoft Corp. MS-DOS cost \$1,150. MBP Software and Systems Tech-nology, Suite 260, 1131 Harbor Bay Pkwy., Alameda, Calif. 94501.

Cleo Software has announced the Clee 201/212 personal computer-

Clee 201/212 personal computer-compatible internal modem.

The modem combines a 2,400 bit/ sec. synchronous modem with a 1,200 bit/sec. asynchronous modem. It features autodial and autoanswer

The single internal interface box requires one expansion slot and one telephone line. It has an RS-423 port for connection to an external modem.
With asynchronous software, the
modem costs \$1,195. With synchroas software as well, it costs

Cleo Software, 1639 N. Alpine Road, Rockford, Ill. 61107.

Other features include the ability to remove perspective effects, allowing the user to see flat models; the ability to reduce, reduce to fit and en-

The Clipper Autumn '86 package costs \$696. Registered users can up-

#### Data storage

Computer Peripherale, Inc. has mounced Drivemaster, a disk drive introller board for IBM Personal imputers, Personal Computer XTs emputers, Pe

and ATs.
Drivemaster is said to operate 54in. and 344-in. diskette drives and
360K-byte and 1.2M-byte media. It
supports 46, 96 and 180 track/in.
read/write formats. Any combination of up to four internal or external
drives and media are interchange-

r memory and read-only memory oftware.

\$249. Cor

Printers/Piotters/Peripherals

C. Itoh Digital Products, Inc. has anounced the Prowriter C-715 Reli-at, the firm's seven-color, 24-pin

dot matrix printer.

The printer offers up to 300 char./
sec. printing in draft mode and 100
char./sec. in letter-quality mode.
It uses a plug-in identity card that



C. Itoh's Prowriter C-715 Reliant dot mate

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traffic and transparently pass higher level protocols such as TCPIP XNS<sup>®</sup> and DECnet<sup>®</sup> On broadbend and beroptic media, Applitek bridges

by and using the

It works like thise Each Appliek Ethernet/IEEE 802.3 bridge dynam-ically builds and mantains an address map of devices on its local subnet. It uses this address map to keep local traffic on the Ethernet/IEEE 802.3 subnet while littering remote traffic onto the backbone network and vice versa. Traffic for remote sites is filtered through the T1 bridges across dedicated tele-

Applies's Ethernet/IEEE 8023 bridges use the Motorola 68000 processor and AMO bit sice microprocessor. They are modular in design and can use 10 Mbps baseband, broadband or fiberoptic cable as the backbone media. The Appliek Ethernet IEEE/8023 bridge

is one of a range of terminal servers, gateways and high speed host-to-host erateled per-th efficiency. a powerful formance and bendwidth efficiency. They are supported by a powerful Network Menagement System providing system configuration and control neel time monitoring, security and extension of formatters.

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plied Technology for Communications Solutions

allows the C-715 Reliant to emulate printers such as the IBM Proprinter XL, the Epson America, Inc. LQ-1000 and the Toshiba America, Inc. 381. The Reliant features a quiet mode, proportional printing, automatic paper loading, push-pull tractor and bottom feed.

bottom feed.

It has both Centronics Data Computer Corp. parallel and RS-232C serial interfaces, transmission speed of up to 19.2K bit/sec and a standard SZE-byte buffer.

The C-715 Reliant is priced at

\$1,296. C. Itoh Digital Products, Suite 220, 19750 S. Vermont Ave., Torrance, Calif. 90502.

Board-level devices

Boca Research, Inc. has released Becaram, an expanded memory board for the IBM Personal Comput-er, Personal Computer XT, PC And and compatibles with CPUs operat-ing at speeds up to 12 MHz. and compatible with CPUs operat-ing at speeds up to 12 MHz. she in four memory configurations from 10K to 2M bytes. Bocaram conforms to the Lotus/

from 10K to 2M bytes.

Bocaram conforms to the Lotus/
Intel/Micrososft Expanded Memory
Specification. It requires no switch
settings for single-board installations
and only a DIP switch for more than
one board.

one source.

Bocaram comes with installation software as well as ram-disk and print-spooler software. It is priced from \$195 for the 10K-byte version to \$740 for the 2M-byte

version.

Boca Research, 6401 Congress

Ave., Boca Raton, Fia. 33431. **Auxiliary equipment** 

Auxiliary equipment, Inc. has introduced the Unix Refuey, Unix/ Microsoft Corp. 185-DOS keyboard templates for Unix System. The templates read to be based on Artis's Unix System van Microsoft Corp. 185-DOS keyboard van de Gregoria of the Unix System van de Gregoria of the Unix System van de Gregoria of the Unix System van de Gregoria of the Unix Proposition two-color format. The information on the template includes commands and their descriptions, haise and procedures and procedure and procedure and shert Unix and DOS commands, the vendor said.

vendor said.

Models are available for the AT&T
PC 6900 and AT&T PC 6900 Plus. Refkeys carries a price tag of \$20

McNulty Development, P.0 1167, Piscataway, N.J. 08854.

coeft Corp. has announced oft Mouse Version 6.0 with ded software support and ani-

s applications such as Lo-pment Corp.'s 1-2-3. It also rates a graphics pre-re system that allows te gre cs and as

stations. use features 200 point/in The sensitivity can b

The secusion The sensitivity can be controlled with a pop-up control panel, the vendor said.

The Mouse is available in a serial-port version for \$195, a bus version for \$175 and an in-port version for

Microsoft, Box 97017, 16011 N.E. 36th Way, Redmond Wash

#### NEW PRODUCTS/COMMUNICATIONS

#### COMMUNICATIONS

Ungermann-Bass, Inc. has intro-duced the Network Interface unit Model DMF32, a network interface Model DMF33, a network interface unit for connecting a personal com-puter or terminal to a Digital Equip-ment Corp. VAX system over a Net/ One local-area network. The two-board unit plugs directly into the backplane of a VAX system to provide support for up to 32 VAX

connections running at speeds up to 19.2K bit/sec. It emulates four DEC eight-port DMF32 1/O controllers and can off-load Net/One protocol processing from the VAX.

from the VAX.

PCs running the vendor's 3270
Personal Connection Model II soft-ware can maintain up to two sessions
with a VAX minicomputer while si-multaneously running PC applica-tions and two high-speed 3270 termi-nal sessions with an IBM host

computer.
The baseband NIU0DMF32 model costs \$6,495. The broadband model costs \$7996.

Ungermann-Bass, 3900 Freedom Circle, Santa Clara, Calif. 95052.

Micro Technoloy, Inc. has intro-duced Megna, a communications con-troller said to provide a 10th-bit/sec. data transfer rate and the ability to connect Digital Equipment Corp. Q-bus computers to both Ethernet and him-wire communication channels. Connection to either Ethernet or

thin-wire communication channels, thin wire communication channels, thin wire is done through Menta, a writch-sulctable ulterface panel. Other features include various part of the monthly of the monthl

er they cost \$1,975. icro Technology. 16 Micro Technology, 1620 Miral Ave., Placentia, Calif. 92670.

arse, Woodworth & As reational, Inc. has as SNA/X.25 Network Co said to act as a front-end p centrator and a packet a

and disassembler.

The controller supports connection of all IBM Systems Network Architecture (SNA) LU interfaces while providing SDLC ports for IBM systems; CCITT X.25 connections for es in IBM

et SNA communic As a concentrator, it permits mul-tiple hosts to share communciations lines; full duplex communciations in SDLC environments; and off-loading

l link-level error recovery from sets. The SNA/X.25 supports up to 0 multipoint SDLC or X.25 commu-cation lines at speeds up to 56K bit/

The unit is priced from \$30,000. CWA, Suite 210, 18805 Cox Ave., Saratoga, Calif. 95070.

Standard Microsystems Corp. has introduced the Arcset-PCI10 Short-Slot Local-Area Network Con-troller Board for IBM Personal Com-Up to eight Arcnet-PC210s may be

daisy-chained together over a dis-tance of 1,000 feet.

The unit incorporates the vendor's surface mounted COM9026 local-area network controller and the 9032 Arenet local-area network transceiver circuits to provide protocol handling. It features a 22-byte, on-board ta packet buffer and an on-board 8K-byte programmable read-only

memory socket is available, acc ing to the vendor. The Arcnet-PC210 costs \$595.

Standard Microsystems, 35 M cus Blvd., Hauppsuge, N.Y. 11788.

Voice/data communications Northern Telecom, Inc. has announced the Displayphone 220, an enhanced data terminal with integrated telephone features.

The Displayphone 220 is said to emulate Digital Equipment Corp.'s VT100, CT220 and VT82 models. It rates with the vendor's private

branch exchanges, Meridian Si-1 integrated services networks and Meridian Di-1 data voice systems.

It offers a 9-in. Lilk-and-swived screen that displays in 80 or 132 columns, a serial port and a parallel printer port. Voice features include two telephone lines, a personal directory with automatic dalling, last number redisil, hold and mute. An optional internal autonawer modem

number redist, note and mute. An op-tional internal autoanswer modem operates at 300 or 1,200 bit/sec. Displayphone 220 costs 4896 or 1,086 with an internal modem. Northern Telecom, 200 Athens Was Northern Telecom, 200 Athens Northern Telecom, 200 Atl Way, Nashville, Tenn. 37228.



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#### Protocol converters

tions, Inc. has added the ENET to its Eliminator ries product line. The EL-ENET is a con

The EL-ENET is a conversion device providing Ethenet users with the ability it transmit data over twistedpair wiring to a remote pripheral. It transmits over ether 22-gauge or 24-gaugwire and will transmit with out degradation for 250 ferfrom the transceiver box i

the remote device.

EL-ENET costs \$150 per

Hinckley Commutions, 14 Parker Road, C ville, Mass. 02655.

Apoint Corp. has intro duced the Xpoint 6294 multi function protocol converter.

link ASCII terminals, prin ers and personal computer to multiple IBM System/3-36 and 38 computers, as we as to non-IBM minis, concur rently.

According to the vends to the minicomputer, to 5294 looks like a 5251 Mod 12 or 5294 remote contrust with attached 5251-1 terminals or 5256 printer To an asynchronous hot bearings attached to the 5204 look like they are a tached directly to the host. The 6294 can be conflictly for the first wind with a first control with the first control wit

232 ports. Prices range for \$3,995 to \$5,995. Xpoint, 5600 Oakbro

#### .....

has introduced Netlih, fun tion libraries designed to pr vide record- and file-lockic capabilities to Nantucke Inc.'s Clipper Dbase III cos piler running on a variety networks.

Netib is said to allow programmers to write programs allowing multiple users to have the same files open, but prevents users from updating the same records at the same time. Features include the ability to lock records and files; identify the logged in user; and initiate or termi-

Netlib comes with obj files, instructions and a sa ple application. Each versi

Suite 900, 701 Seventh A New York, N.Y. 10036.

SCA Products and Sevices, Inc. has announce Gateway PC Belease 2, timicro-to-mainframe link armainframe data transfproduct for IBM Person Computers and compatibles. The release adds IB 3278, Forte and CXI. Inc.

#### mmunics- Multiplex

iona Associates,
Protocol support

Attachmate Corp.

3, Xmodem and en added to supid.

p. veiled Attachremete 35 connections for IBM-comp lible personal computers.

The products are said 2 support four host sessio C. printer emulation, IBM 1 transfer, 3270 Personal Cc puter API and SSG graph

nicate with IBM mainf processors.

The family consist three models. FastSDLC uses a half-length card to connect to an external modem and supports line speeds to 19.2K bit/sec. It costs \$645.

t/sec. It costs \$645.
Autolink-48 integrates a
SK bit/sec. modem and audialer with the IBM Synrosous Data Link Control
ispter. It costs \$1,995. Both
me with \$270 remote stamultisession software,
thich is available separately

Attachmate, 3241 118th Eq 8.E., Bellevue, Wash. 98005. He

rs Racal-Vadic, Inc. has an rct nounced the 2400FA-85 and the 2400FA-SH synchronou K SDLC and HDLC-compatible

serial autodisler modems.

The modems connect directly to RS-232C communications ports. The modems
can be controlled by a short
autodialing applications program that runs under the exsisting communications software of the IBM Series/! and
System/36; the Digital
Equipment Corp. VAX; the
Hewlett-Packard Co. the
Hewlett-Packard Co. the



One of the most significant developments in IBM ASCII terminals is the one you may never use.

mm Data, 12347-E

e Valley Drive, Reston,

ers.
The modems are priced at \$795 each. 1525 McCa Blvd., Milpitas, Calif.

n Data Corp. has e modem is said to sup

speeds of 1,400, 1,200 and 300 bit/sec., and V.29-com-patible speeds at 9.6K bit/

The modern is available as stand-alone unit with as a stand-alone unit with an BS-232 connector for main-frame, mini and micro appli-cations; as an internal half-card board that fits into an IBM Personal Computer ex-pansion slot; or as rack-mount cards for mainframe

answer capabilities

Pasto

Scitec Corp. has an-nounced the Saturn 15/20 T-Carrier Modem. en is s equipped with all 1/0 con It is said to be able to per-

form encoding.

According to the vendor, the modem converts RS-422

V.36 signals to 1.544M bit, sec. or 2.048M bit. al CCITT G.703 in The m m fea

nt. external, loop

The Saturn 15/20 T-Carrier Modem has a price tag of \$1,450 Scitec Corp., 850 Aquid-

neck Ave., Middletown, R.I. 02840.

Algo, Inc. has announced the Algo MC610, a statistical mmunications multiplexer id not to be restricted to

ple point-to-point opera The MC610 is said to be ble to have multiple com-osite data channels, permitting assembly of a network with up to 500 computers and terminals. Port-swi ing features allow RS-232 de vices to dynamically connec

to any other local or rem RS-232 device. Concentration make it possible for multipl terminals to communicat with a single local or remot computer port. The MC510, with si

erts, is priced at \$1,495. Algo, 9198-C Red Bra.

bia. Md. 21045.

According to the vendor the Artel Slimline multiplex ers can now be configu with various combinations of coaxial, telephone wire and fiber-optic cable. They can use coaxial or fiber optics to multiplex up to 32 IBM 3270, Type A terminals over a sin gle cable. They can be config

ured as point-to-point, m drop or star systems. The fiber-optic multip The fiber-optic multiplex-ers, which allow eight to 32 terminals to be multiplexed over one dual-fiber cable, are priend from \$950 to \$2,250. Artel Communications, P.O. Box 100, West Side Sta-tion, Worcester, Mass. 01602.

Micrecom, Inc. has announced a line of personal computer card modems.

The modems, the PC/9524c, PC/2400c and the PC/2400 feature the Microcom

Networking Protocol (MNP).

chronous internal modem for the IBM Personal Computer.

Personal Computer XT, PC AT and compatibles. It is ca-

pable of throughput up to 19.2K bit/sec. The PC/2400c

The PC/9624c is an asy

Our superb ergonomics, for one thing. And our quan-

tity discounts, for another. Neither is the availabil ity of financing from IBM

Credit Corporation. Or the quality and support you'd expect from IBM.

contact IBM or your marketing representative. Or call

vou. applier in the U.S. and Poerte

neing an IBM first: the three-year ASCII terminal warranty. Here's how it works.

Should you have a problem with any of the three elements\* of an IBM ASCII terminal purchased after June 15, 1986, just take the problem element to any IRM Service Ex-

change Center or IBM authorized remarketer.

They'll exchange the non-working element for one that works: So you'll be on your way with a minimum of downtime. How will you know

which element isn't working properly? Our built-in diagnostics let you know quickly. Of course, all this may well be academic. For given

the reliability that's built into every IBM ASCII termi nal, the three-year limited warranty is one feature you'll probably never need.



obine 1500 Lear Singler ADM-SA Lear Singler ADM-S Tale Video 190, 900+, 102, 100, 725, 1056 × × TeleVideo 950 T139, 30:50+ ī BM 3301 x

3002 3002 3003 3004

ntroducing the 132-column IBM 3162.

But our three year warranty isn't the only significant development in IBM ASCII terminals.

There's our new fullfunction 3162. It features a crisp, clear,

readable 7 x 12 character matrix.

And it's available with our new amber-gold 14-inch screen. Or our new green 14-inch screen. Your choice.

What's more, not only is the IBM 3162 switchable between 132 and 80 columns, it shows 28 rows of data. Which enables it to display

even more information. The 3162 comes with a compact, yet fully-functional, 102-key keyboard. Or a space-saving 84-key keyboard.

But, of course, size isn't everything. Read on.

New development in emulation.

Our exclusive plug-in **Emulation Cartridges allow** all our ASCII terminals to operate in the most widelyused data streams. (Including the DEC VT 220 and

WYSE 50+.) So that instead of changing terminals, you merely change cartridges. And, in addition to their

changeable personalities, all IBM ASCII terminals share another trait. The ability to operate in their own functionrich native mode.

What isn't new.

For more information,

1800 IBM-2468, Ext. CM/90 for the IBM authorized supplier nearest

is said to achieve throughput of 5K bit/sec. or higher over a 2,400 bit/sec asynchro The PC/2400 can provide throughput of up to 2,900 bit/sec. over a 2,400-bit/sec ction. All three employ MNP. They are single-slot full-card modems and include standard phone line inter-

The PC/2400 costs \$69 the PC/2400 costs \$799; and the PC/9624c is priced at \$1,749.

1400 Provi Highway, Norwood,

A full SNA LAN/Gateway,

Local-area networks Pox Besearch, Inc. has mounced 10-Net 3.1, the e of its local-area

metworking system.
Written to support the ex-tended Microsoft Corp. MS-DOS 3.1 and 3.2 calls, 10-Net Version 3.1 is said to provide compatibility with the mul-timaer software applications written for the networking According to the vende e product offers expand

res rep

are said to include enhanced printer spooling and dynamic drive sharing. 10-Net comes with an in-terface card, software, tap box, cable and manual. The networking system

Inc.'s Corp.'s (LAN). ets \$595. Fox Research, 7016 Corpo-

e Way, Dayton, Ohio

n

30

sions are available for con-The gateway system of tion allows the connection of onnection of ers to exist (SNA) or B

s Comb works without necessitating system changes or 3274 con-trollers, according to the ven-

outer as multises

with hardware, costs \$1,990. Information Technologies, 7850 E. Evans Road, Scotts-dale, Ariz, 85260. Network services

Atlantic Besearch Corp. provided between personal computers stiached to a LAN and an IBM or compatible has announced an on-line ap-plication program library for test equipme

The service is an application program library service that connects users of Atlantic Bessarch's Interview line source of IBMS Systems Network Architecture, CCITT X28, Bisyrs and other application programs and other application programs available, grams and documentation.

ARC Access can be accessed by an Atlantic Research Data Analyses or ASsearch Data Analyses or AS1,300 bis/leve\_asynchronous

1,200 bit/sec. asynchronous

modem.
The service is available free of charge.
Atlantic Research, 5390 Cherokee Ave., Alexandria, Va. 22312.

Test equipment

L-Com Data Products has introduced its model DG-908 RS-232 breakout box.
The self-contained monitor and breakout box is said to have everything needed to the tit I/O conditions. Except for pin 1, all 24 lines can be switched open or closed. Any line can be interconnected by using times the title of title of the title of title of the title of

line can be interconnected by using jumper wires. Twelve two-color LEDs mositor lines 2 through 6, 8, 15, 17, 20, 21, 22 and 25 with two spares. The unit is powered by two 9-volt bat-

The DG-005 is priced at

\$189.95. L-Com, 1755 Ongood St., North Andover, Mass. 01845.

**Auxiliary equipment** 

B&B Electronics Man ring Co. has announced BAB RS-232C-to-RS-

the B&B ES-232C-to-ES-422A converter.

The converter uses bal-anced differential signals to permit communications on cable lengths up to 4,000 ft with bit rates up to 90K bit/ sec. When used with multi-dram sevatems, the converter drop systems, the converter allows up to 10 receivers to be connected to a driver at once, according to the ven-

dor.
The converter is priced at 449 95 including a male DB25P connector for R5-23C and a female DB25P connector for R5-23C and a female DB25P connector for R5-23C and a female DB25P connector for R5-23C interface and a male DB25P for R5-422A for 849 95.

B&B Electronics, 1500P Bown Memorial Drive Dt2-869 95.

Boyce Memorial Drive, Otta-wa III 61350

SCIENCE/SCOPE®

(MULE) can designate tragest for sell laxer-painted waspure, licitating Laxer Marvick, Helliferi, gardet brush, and cames-haushed laser-painted programs. But III 22 is portable tryinged to contract the contract of these models as I have designated regardent or laxer than the last set and the contract of these models as I have designated regardent, as the contract of the last set and the last se

Military commanders at appende headquarters can share up-to-the-minute information, thanks to a new automated message processing system for Command and Control Information Systems (COS), and the processing of the Command of the Control Information Systems (COS), specified in the Juli (SPANU military sporting system. It will framewholly intent the time needed to update pleaning, intelligence, and force states information in command and control systems. The system can receive message over a wavely of digital links. Managers can be drown automatically from compiler relational databases, or be used to update information automatically. Information can be displayed on ceres in a wavely of fromtas, and be modified by commanders.

A new infrared viewer combines numerical temperature rendonts and thermo-electric cooling to spot heat leaks and other energy looses more efficiently. The device is the linest model of Proboyet viewers from Highes. As all units in the line, he Model 699 viewer area beat the way a camens so viewent from Haghes. As all some in the law, the Model 600 viewer are better shool of Priblogs and the Model 600 viewer are better the veg camers on the law of the law of the Model 600 viewer are better the veg camers on the law of the law of

State describt, which can famme mention microsfectomics one in small done, in being combined on minink manufectoring lines at Polipsis. The production lines in Paccas, Artenus, are being conjugate with combination floor files and new work banden that have sain stands tops. These steps have been completed for the ris- - strice. In Merelich, parts of and sult TOW, and the control circuit may be considered from the control of the risk of the risk of the production of the control circuit control of the control of t

Support Systems in Southers California designs, developà, and manufactures sonie of the most replainfactured training similations and a wide energy of motoratic next immunities bet systems. In addition, operating at top efficiency workfolds (Dyportunities are realished for a viergy of engineerin qualified by degree or extensive work superimore. They lichole systems engineers, nate engineers, and softwa and hardware design engineers. Please next door personness to Journal Anderson, Professional Employments, Dept. 33, Hughes Alcrent Compusey, PO. Box 1999, Long Beach, CA 5000-04603. Eggal opportunity unspiece. USA citamather required.

HUGHES

#### SYSTEMS & PERIPHERALS

Turnkey Systems stachecker Systems, Inc. h

sale (POS) systems based on a 32-bit

icroprocessor.
The Series 3000 is said to be fully orgrammable. It is based on Intellinat POS terminals and an optional 
natroller. The Shared Terminal Apleations Resource (STAR) controlprovides reporting, data base 
sintenance, communications/credit, systems network interface and file server functions. Up to 127 Series 3000 terminals can be connected to a

STAR controller.

The terminal is available in either an integrated or modular design and comes with expandable memory and storage, terminal data base and retail transaction. set. Each terminal can

transaction. set. Each terminal can support up to 32 peripherals. The Series 3000 integrated model costs \$3,640. The modular terminal costs \$3,096. Datachecker, P.O. Box 58090, 2900 Semiconductor Drive, Santa Clara, Calif. 96052.

#### Processors

Unbound, Inc. has introduced the Dataqube 100 and the Dataqube 103, Digital Equipment Corp.-com-

The Dataqube 100 includes a four-quad slot backplane, dual RX-60 flop-py and a 51M-byte disk drive. It fea-tures an 11/23 or 11/73 CPU, floating-point processor, RT-11 oper-ating system, 512K-byte memory and a customer-defined data acquisition

a customer-defined data acquisition board package.

The Dataqube 103 incorporates the same features with an enhanced small-device interface 170 or 380M-byte disk drive.

Prices start at \$5,995. Unbound, 15239 Springdale St., Huntington Beach, Calif, 92649.

Vero Electronics, Inc. ha ced a family of single boar ters in single and dual high

nting style. he VMEbus-co the VMEbus-compatible data pro-ng modules, compatible with rols, inc.'s VMEbus, feature a rola 68000/68010 processor op-ng at 10 MHz and a 128K-byte able, programmable read-only ory.

and the series of single board appeters include a 512K-byte zeroit state, local random-access memory, two, socal random-access me ory, two serial ports and a seven-le el interrupt handler.

ices start at \$572. Bicc-Vero Electronics, 40 Linds an Drive, Trumball, Conn. 06611.

Harris Corp. has announced the Emitter-Coupled Logic (ECL) shared-memory system designed to allow Harris superminicomputers to support high-performance memory boards in a multiprocessing configuds in a multiprocessing configu on of up to 12 Harris 1200 sys

According to the vendor, the sys-tem features an 80M bit/sec. band width.

oth. Other atttributes included are cy-

cle and access times said to be 30% to 50% faster than Harris's other shared-memory systems. The ECL shared-memory unit is

ced at \$27,500. The port kit required for each pro-mor in the configuration is priced

Harris, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

DY-4 Systems, Inc. has announced the SVME-103, a single-board VME-

bus computer. bus computer.

Processing power is provided by a
10-MHs Motorola 68010 CPU with a
68881 floating-point processor.

The 5128 bytes of on-board, dualported memory can be accessed with
zero-wait states and offer parity

Continued on page 140 CPF

#### The CICS Print Facility

CPF is the complete CICS based report distribution system. at reports from CICS applications . Spools reports from JES or POWER

 Message sending
 Allows secured user access to reports. Forms controls
 Deplays reports on-line Automatic Aging
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CPF allows sites to choose how they want repo or print on line reports in batch. Complete control of report detribution is accomplished at every level in your organization. Sits specific install options allow also to utilize the poolings for their own specific use. OPF is a full feature print spooling package that performs the work.

OFER evaluable for OS and DOS sites and is compatible with all CICS envir.

Call factor for a free trial or more information — (200) 843-951



d in h in the on

Software Technology, Inc. 12725-B Miller Road N.E. Beinbridge Island, WA 96110



8525 S.W. 129 Jerrace

s of the board system controller ade a multilevel bus arbi-systein clock generator

According to the vendor, the SVME-103 is priced at \$2,423. DY-4 Systems, Suite 200 1476 South Per Came

Here Memory, Inc. has sunced the MM-7250D -ported, Multibus/ILBX/

SI memory board. The board is said to have a capacity of 4M

The ILBX port can op either the synchrono synchronous mode ero-wait states when used with the ISB286/10A or SBC286/12 8-MHz micro-

mputers. The MM-7250D is al: The MM-7250D is also said to be compatible with systems employing the Intel Corp. 80286 or 80186 micro-processor or the Motorola, inc. 68000 microprocessor. According to the vendor, the product features an error status register for detecting parity errors on the multibus bus.

Memory is available in 512K bytes, 1M byte, 2M bytes and 4M bytes. The 4M-byte version is priced at \$1,550.

sar Ave., Chatsworth, Calif. 91311

has introduced its SEAM-3 VMEbus/VMXbus memory board for Motorois, in-

board for Motorois, inc.

VMEDus systems.

The SRAM-3 memory
board offers electronic flux
bytes of dual-port static random-access memory (RAM)
or 1 M byte of dual-port static
RAM.

RAM.
According to Force Computers, the VMEbus interface includes 24- and 32-bit adresses as well as 8-, 16- and 32-bit data.
The VMXbus interface is the standard A24 and D8, D16 and D32.

D16 and D32.
The vendor reports un-aligned transfers and rend-modify writes are supported on both buses.
The VMDsus board fea-tures an average write access time of 80 aanoeccond and an average read access time of 210 aanoecconds.
Other attributes of the board include an average

board include an average write access time of 70 nano-seconds and an average read access time of 210 nanosec-

onds.
The 512K-byte SRAM-3A
and the 1M-byte SRAM-3B
are priced at \$2,650 and
\$4,150, respectively.
Force Computers, 727 University Ave., Los Gatos, versity Ave., Calif. 95030.

Graphics systems

Tektronix, Inc. has an sunced the 4100F3F Field t, an interactive direct mory access (DMA) inter-te for its 4120 series work-

stions.
The interface is said to alw single-path, interactive
mmunication at parallel
MA speeds between the
120 series system and a host

mputer. The first interface avail-ie was designed for use

Corp.'s MicroVMS-based Mi-crovax II.

Including the hardware for the DMA on a 4120 system, a DRV-11WA interface card, internal cables and con-sectors for the Microvax, a software driver for installation under MicroVMS and the parallel interface cable that connects the two systems, the 4100PSP is priced at

tronix, P.O. Box 1000, ville, Ore, 97070.

with Digital Equipment Corp.'s MicroVMS-based Mi-

tile Micro 8 lne. has announced the BMS 0106 centrollee for fixed dishts, floopy diskt and tape. The SMS 0108 was designed for Digital Equipment Corp.'s Microrat II and LSI-11 CPUs. It supports enhanced small device interface—and STS00/412-compatible Winchester disk drives. It uses an enhanced vention of East Storage Com-vention of East Storage Com-vention of East Storage Com-

Data storage

with Winchester and floppy litives and an enhanced ver-sion of tape MSCP to commu-ciate with QIC-02 N-in. car-ridge tape drives. Pestures netude four direct memory scoses channels; command sputing of up to eight I/O commands; on-board error correction code logic; and overlapped seeks for mutil-tive confinenzations.

overlapped seeks for mi drive configurations. The 0108 costs \$1,160. Scientific Micro Syste 339 N. Bernardo Ave., Mo tain View, Calif. 94043.

Introducing the new team of Fujitsu business modems.

nu can rely on Fujitsu's new line of ness moderns to get your impor-messages through. Even while yone's out at lunch.

9+% reliabili ms are built for de-

regime moderns are built for de-endable performance, and we car, rove it. Over the past three years, re've shipped thousands of modern or major American corporations. Less than 1% have been returned.

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On the job, our modems average over 70,000 hours before needing service. Which means you can exp 7.99 years of fault

Over 20 years experience We've been designing data co

2.4 to 14.4 kbps

Whatever your application, we have a modern in the speed you need. From 2.4 to 14.4 kbps. And our moderns are

Up front simplicity

Whichever Fujitsu moderns you choose, everyone in your office will

DB Systema, Inc. has in-seed a family of Remov-Mass Storage subsys-for users of Digital pment Corp. Q-bus, Unicombination of two 514-in. disk drives or a disk drive with a TK50 tape or RX50 VAX and Microvax II

according to the vendor, Removable Mass Storage es provides the remov-ity and vibration protec-

ppy backup. A total of 620M bytes can

a nemovable Mass Storage with two devices and controllers \$14,723. avia St., Orange,

Dual Systems Corp. has nnounced its VMEbus small smputer systems interface SCSI) controller, VSCSI. The VSCSI in a single-ard computer with an inet memory ac-

controller.

The VSCSI controller is ca-pable of controlling eight SCSI initiator or target de-vices such as cartridge tape drives, hard and floppy

The board features 512K bytes of local dual-ported random-access memory and programmable read-only memory. It supports the 1.5M According to the vendor

with the addition of a serial port board, the VSCSI can perform as a computer and serve as a VMEbus master. The VSCI is priced at \$1,785. Dual Systems, 2530 San

Pablo Ave., Berkeley, Calif. 94702.

PM3010 Strees on security of the patter systems interface Caching Controllers.

Four enhanced small device interface (ESDI) drives with data rates up to 20 MHz may be controlled with a 516-in. extended form factor board. The PM3010/70 is unport both hard board. The PM3010/70 is said to support both hard sector and soft sector ESOI drives with up to 256 heads and 4,096 cylinders. It pro-vides fully automatic disk formatting upon receipt of a

formatting upon receipt of a single command from the host computer. Peatures include automat-ic medium defect manage-ment, automatic flushing and the ability to prefetch and lock specific blocks into

The PM3010/70 ESDI is The PM3010/70 ESD1 is priced at \$940. Distributed Processing Technology, P.O. Box 1864, 132 Candace Drive, Maitland, Fla. 32751.

Bering Industries, Inc. has announced the Multipac 60, a removable Bernoulli and hard-disk subsystem de-signed for use with He wiett-

signed for use with He wear-Packard Co. computers. The Multipse 60 features an 8-in., 20M-byte removable Bernoulli cartridge with bulk-in, 40M-byte fixed hard-disk storage. It is said to be view-compatible with to be plug-compatible with HP CS/80 and SS/80 comput-

The Multipac 60 costs \$6,790, including one 20M-byte Bernoulli cartridge. Ad-ditional cartridges are priced at \$95.

lace, Fremont, Calif

#### Terminals

Datachecker Systems, Inc. has introduced the 2200 Keyscan System, a point-of-sale terminal designed to move from one-key entry to

According to the vendor According to the vendor, users can take the 2200 Keyscan system from a sin-gle, stand-alone terminal to a fully configured, multilane scanning system backed up

scanning system backed up by a microcomputer. Attributes of the system include the ability for soft-ware to manage up to 100,000 price lookups and re-spond to them at a rate of

300 lookups per min.
The Datachecker Systems
2200 Keyscan System is
priced at \$2,300 for the key

entry unit.
Datachecker, P.O.
58090, 2900 Semicondy Box Santa Clara, Calif.



So if you'd like one less business roblem to worry about over lunch, rder Fulltsu moderns.



RUJITSU AMERICA, INC. DATA COMMUNICATIONS 3055 ORCHARD DRIVE SAN IOSE CA 95134

pusean, Inc. has announced spusean Model 345 PCS Page a combination text and im-neer for IBM Personal Com-

is incanner for IBM Personal Com-tern, XTs, ATs and compatibles. The Model 245 is said to automati-ly read, digitise and transfer-ges of typewritten text and in-ne, such as line art, charts, graphs, goe and signatures, to personal mouters. As many as 60 pages at a ne reportedly can be stacked for consult feeding to the vendor, images According to the vendor, images or examed at resolutions of 200 or

u onta/in.
Images can be bit-edited, rotated,
motated, moved, cropped, shaded,
peated and merged with text.
The Computera Model 245 PCS is
iced at \$3,995.

mpuscan, Building 2, 81 Tues Road, Fairfield, N.J. 07006.

int Corp. has announced its

IBM bibs or satisfie terminal one-91 is said to be an AS-al that can be used with and converters to access CII te



IBM System/34, 35 and 38 com It comes standard with eith 6251-11 or 5291 keyboard configur

Remote-01 features a five-line, 80-column screen and has main and sux-lisary ports that are 88-282 compati-ble and can transfer data at up to 19.25 bit/nec. The Remote-01 terminal is priced at 8848.

Xpoint, Suite 130, 5600 Oakbrook Pkwy., Norcross, Ga. 30093.

memory and battery backup option for its Series 5000 factory data col-lection terminals for use on the DPS 6 The option is said to pro

ous operation at the terminal lev-

It offers 40K bytes of available internal memory to store data in case of a local line disconnect or host down-time. Local programming capability

time. Local programming capability is also available.

The unit is said to automatically senue the disconnect and reconnect function and switches to the local program mode.

The battery backup feature allows normal operation of the terminal for up to three hours, according to the

The data entered and stored will The data entered and stored will be retained for up to seven hours. The memory and backup option is priced at \$1,000. Honeywell, 2222 W. Peoria Ave., Phoenix, Ariz. 85029.

Printers/Piotters

Interface Systems, Inc. has re-leased the ISI 528, an IBM System). 34, 35 and 35 plug-compatible desk-top dot matrix printer. The printer is said to feature bar coding capabilities, a demand-docu-ment tear bar and a dual twin axial/ Centronics Data Computer Corp, par-allel port for connection to IBM Per-



The ISI 625 prints at 400 char./ sec. in draft mode and 100 char./sec. in near-letter quality on continuous-feed forms, labels, tags and tickets. Character spacing can be 10 or 16.67 char./in. The ISI 525 is priced at \$4,9

Interface Systems, 6856 Inter Drive, Ann Arbor, Mich. 48103.

JDM, lisc. has announced the 840 EWS, 840 EWS, GL and the 840 EWS with GL Processor Controller, a series of color printer/plotters dispand for engineering workstations. The 850 erries provides 14-color plotting. The 850 EWS has a piet speed of 24 in./sec. at a resolution of 30 by 80 dot/in. In accepts making by 180 dot/in. It accepts making by the second of the se

fonts in print mode.

The JDL 850 EWS/GL offers the same features as the 850 EWS and Hewlett-Packard Co.'s Graphics Lan-Hew lett-Packard Co.'s Graphics Lan-guage (HP-GL) compatibility as well as standard serial and parallel ports. The 850 EWS with GL Processor Con-troller has all the features of the 850 EWS in addition to HP-GL compatibil-ity and vector file conversion, which are performed by an external or

ler.

The 860 EWS costs \$2,496. The 850 EWS/GL costs \$3,496 and the 850 EWS with GL Processor Controller costs from \$3,496 to \$3,896, depending on the amount of memory.

JDL, Sults 104, 2801 Townsgate Road, Westlake Village, Calif. 91361.

which provided pro-grammers with rapid access to programs and data. Then along came Fie-AID, a sophisticated software tool that magnified the power of ISPE File-AID allows during the provided provided the power of ISPE File-AID allows during the provided that the power of ISPE File-AID allows during the provided that the power of ISPE File-AID allows during the provided that the power of ISPE File-AID allows during the provided that the power of ISPE File-AID allows during the provided pro-tor of the provided that the provided pro-tor of the pro-tor of the provided provided pro-tor of the provided pro-tor of the provided provided pro-tor of the provided provided pro-tor of the provided provided provided pro-tor of the provided provided provided pro-tor of the provided provided provided provided pro-tor of the provided provided provided provided provided provided provided pro-tor of the provided provi cure access to data without programming, intering both rousine and special utility functions, sees records of any length, and handles VSAM other access method. But you need STILL MORE Now it's available with File-AID. Major fund

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es any record length. Edit ted records, based on A thousand satis n, call Con ID. For more information, call Cor WE PUT THE POWER IN YOUR



### **NEW PRODUCTS/SYSTEMS & PERIPHERALS**

Western Graphtee, Inc. has announced an A/B-size desktop plotter called the PD 9811/P.

The 9011/P is a 4-pen pinch roller plotter featuring an automatic paper feed capable of handling up to 100 sheets at a time. It is said to have a maximum plotting speed of 18 in./

sec.

Both the Graphtee Protocol Graphics Language and the Hewietz-Packard Co. Graphics Language emolation commands are available. The PD 8011/F is as add to interface with any type of computer via either an RS-222, IEEE or 8-bit parallel interface.

The PD 9311/F costs 43,296.
Western Graphtee, 12 Chrysier St., Irvine, Calif. 92714.

Hewlett-Packard Co. has an-sunced the HP 2563B dot matrix imnounced the ar average part line printer.

The 300 line/min. printer prints at 140 by 144 dot/in. It features a print stand, sound enclosure and passive paper stacker, according to the ven-

dor.

HP also announced a QMS-compatible label-formatting option. Attributes of this formatting option include enhanced bar-code, graphics and labeling capabilities for dot matrice and the control of t

The HP Label Card is priced at \$7,350.
The HP Label Card is priced at \$2,120.

Hewlett-Packard, 1820 Embar dero Road, Palo Alto, Calif. 94303.

Power supplies Nova Electric, Inc. has announced ts 10KVA Uninterruptible Power

stem.
The 10KVA system employs a odern transistor technology in a x-step waveform design. Standard features include a static ransfer switch and a maintenance

ass switch, according to the ven-

The system also comes with a complete diagnostic package that monitors all functions and displays status on the front of the unit.

Designed for data processing applications on IBM System/38 and Digital Equipment Corp. VAX computers, the 10KVA system can also be

ers, the 10KVA system can also be used on process control systems, boil-er control systems, security systems and communications systems. The 10KVA costs \$20,600. Nova Electric, 283 Hillside Ave., Natlaw N. I. 070110.

Isoreg Corp. has introduced the Series of three-phase pais width modulated Isoguard uninter

width modulated inoguard manager-ruptible power systems.

The 056 Series is available in 20, 30, 40 and 60 kVA power ratings.
Each power system features pulse-width modulation SCR power-invertdth modulation SCR power ..... technology, according to the ven-

dor. A supervisory monitor panel that displays more than ten operational parameters, including battery status, data on the rectifier, inverter and output power is included. Other attributes include a way automatic electronic bypass switch and a manual bypass. The units offer bottom-throughtop wentilation and have cabinet-floor cable access.

r cable access. rices for the 056 Series of por

systems range from \$34,000 to Tempe, Ariz. 85281. \$40,000.

P.O. Box 486, Littleton,

PRICE REDUCTIONS ces on some of its IBM 3270-co ible displays, controllers a

The ITT 9210, 9212, 1700 and

1778 displays were reduced from the previous price of \$1,596 to \$1,296. Prices for basic models of the ITT 9440 local controllers were also lowm configuration nov

The minimum configuration now supports 18 devices at a price of \$9,100, according to the vendor. The ITT 9306 color matrix printer is now priced at \$6,700. ITT Courier, 1515 W. 14th St.,

The software uses a computer-used model to reflect a real-life busi-

ss environmens. It is said to help teach business les ns in a risk-free simulation, which

ows the user to create and simu-te the business life cycle of a start-

p company.

Business Simulator requires an
Mi Personal Computer or compatiie with 256K bytes of random-acmemory, according to Beality
schnologies.
It is priced at \$59.96.

Reality Technologies.

Reality Technologies, 3624 Market

St., Philadelphia, Pa. 19104.

Tecmar, Inc. has reduced the prior of its Masestre multifunction board for the IBM Personal Computer AT and compatibles.

The Maestre AT can be configured with up to 2.5M bytes of random ac-

It also provides standard serial id parallel ports, according to the

vencor.

It comes with Tecmar's Chest of
Software package including 20 business and productivity programs including inventory control, a memo

riter and print spooler.

Maestro AT with zero K bytes of memory is now priced at \$529.
Tecmar, 6225 Cochran Road, Solon, Ohio. 44139.

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## **Executive Report**

## Welcome to our world

By PATRICK J. MCGOVERN

s I reflect upon the birth of Computerworld 1,000 issues ago, I can't help but also re-flect upon the state of the computer in-

stry 1,000 weeks ago. The year was 1967, and the topics of the day were vastly different from those issues that command our attention almost 20 years later.

Then, as now, Computerworld is at

McGovern, founding publisher of Computerworld, is chairman of Intertional Data Group, the parent com-ny of International Data Corp. and C.W. Communications, Inc. He is board chairman of CWCI, the publishing group that includes Computerworld and more than 70 computer publica-

the helm, answering the information systems executive's demands for infor-mation in a vast array of areas. Although the industry has not al-

ways agreed with our tone or manner of reviewing products and services, our mission has always been to be an advocate for our readers. We strongly believe that everyone's best interests are served when we speak on behalf of

As Computerworld's readership has increased — we now reach more than half a million MIS professionals in the U.S. alone - so, too, has the scope of our coverage. We are not confined to covering one particular industry seg-ment or product line. As advanced technologies and computing solutions have come to the forefront, Computer-

to-date information not only on main frame trends but also on minicon puters, office automation, cor

ations, microcomputers and so on.
Clearly, the information technology industry is much more complex today than it was when Computerworld was nched. And as a result, the res bilities of executives charged with managing the use of technology are

MIS has been forced to rethink its ission. Corporate computing is no nger restricted to data center manement. The effective use of smallsystem technology is now the single reatest information on processing chal-

The emphasis on the use of small systems has changed not only the information systems challenge but also



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The way is CA

### Executive Report 1 000th Issue

the political balance of power. With end users' systems now accounting for the majority of overall systems spending, it is hardly surprising that dischase shoot responsibility and au-tiful the last few years, such challenges were impossible. In the 1800-and 1870s, the MIS professionals were the high priests of computing, where the high priests of computing, where the high priests of computing, where the high priests of computing,

ters did not serto-way.

With the arrival of the personal
With the arrival of the personal
With the arrival of the personal
With the service of the changed. Today,
ser are some 12 million PCs in the
U.S. businesses, and about oneind of our white-collar work force
we works with some sort of intelliEnd users are now getting firstand experience with creating applitions, data bases, communications
into and the like. An increasing
is and the like. An increasing

eign supplier, how can MIS speed the efficient exchange of information? These are the types of high-level de-cisions a chief information officer should, and will, be part of. Second, MIS most recognize and Company of the company of the change. The effective use of PCa must be among the top proforties, not something to which MIS provides lip-service.

If end users do not perceive MIS as



r have a very good under-ng of their systems and appli-. This has had several key ef-

non-dusers are becoming much for users are becoming much for readily accept MS statements to consching "can't be done" or all the statement of the statement of

ness.

On the bright side, end users are better able to understand DP's problems. End-user computing often consumes a great deal more time than originally planned, while products such as local-area networks have taught end users the hard facta about case of use, documentation, support, training and, most of all, vendor claims.





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But there's more to the 955 than meets the eye.

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# Getting information to the end users



By JAMES A. MARTIN

orporate America is slowly awakening from a hardware

hangover:
Throughout the 1980s, millions of dollars have been spent on mainframes to house the corporate data bases and on microcomputers to appease the processing demands of end users, all in the name of efficiency and

As microcomputers became more powerful, end users became more rowerful, end users became more vocal about accessing the wealth of information stored on the host computer to 
enhance their own reports. The 
MS initiative of the past two 
years has been to wade through 
incompatible operating systems 
and various micro-to-mainand various micro-to-maincommunications path that 
would satisfy both camps.

With all that dispurate hardwith all that dispurate hardwith all that dispurate hard-

With all that disparate hardware in place, the solutions emerging today, and in the future, are focusing on sophisticated software programs to bridge those complex and frustrating gaps.

The paths chosen can be as di-

The paths chosen can be as diverse as the companies implementing them, but there is one area of agreement for analysts and vendors alike — software programs will become more ori-

Not everyone believes there are many end users who need access to data bases. ented toward distributed processing systems that feature built-in, largely transparent micro-tomainframe links. As a resuit, the basic micro-tomainframe pro-

emulation



hardware, will soon be history. In the late 1870s, only 6% to 17% of business professionals in this country were accessing mainframe data, generally through time-sharing systems and terminals, according to Richard L. Crandall, president and chief executive officer of Comshare, Inc., an Ann Arbor, Mich. software vendor.

The microcomputer in the early 1996s was mainly used for stand-alone processing and was without adequate links to the host. "The first generation of micro-to-mainframe links were too trivial and didn't solve the problem," Crandall says. "They got you across the telephone lines, but they didn't really get you into a data base."

Although micro-to-mainframe software and hardware links have become more sophisticated, they are not in themselves a means to an end. "Those links are not economically feasible with the costs of leased or dial-up lines," says Kimball Brown, industry analyst for Datquest, Inc. in San

"The reason many companies bought those links was that for years they had these terminals, and then they began swapping them for PCs that they still wanted to run in the terminal mode." Brown says. "But it they are trying to te those PCs together, they are going to have to find a more economic means."

The function of micro-mainframe links will eventually be absorbed by distributed processing software systems that cross hardware boundaries between micros, departmental processors and mainframes, according to Crandall.

"The micro-mainframe link will become a function of another piece of software and not really exist as a stand-alone product," he says.

"The market for stand-alone links will be zero, but the market for software programs with those functions inherent will be very strong. Distributed data base technology performs what end users originally wanted micro-to-mainframe links to do," says Gary Morgenthaler, president of Relational Technology, Inc. in Alameda, Calif.

### Emphise and way screen

"The open architecture of a distributed data base allows the building of a corporate data base and enables an organization to access information from any computer with no knowledge of the application required by the end user," he adds. Before the advent of distrib-

performed award of distributed processing, corporations often had to grapple with each department using a different software system that was most appropriate for its own applications, Morgerthaler says.

"Now, companies are trying to adopt a small number of software products as standards across the organization. That

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facilitates the ability of end users to access data throughout the company in an integrated system, in adds. Most software systems in the future will have distributed applications as matter of economics, Crandll maintains. "The mainframe is too expensive to use for some funcns that can be done on the micro.

## CISION SUPPORT STEMS: MARKET RECASTS BY TYPE



and the micro is not powerful enough to be a central depository for a data base. If there's a distributed process-ing solution to a DP problem, and it competes with a mainframe-only so competes with a mainfran lution, the distributed solu ing to win."

A t present, there are few soft-ware programs that provide his kind of distributed solution, randall says. "It takes years for companies to work these into their najor systems. But down the road, st new applications will be distrib-d because of the economics in-

Many DP/MIS managers are un-mfortable with end users having rect access to the mainframe data a situation that has boost ree-tiered processing architec-res. Says Crandall: "DP or MIS will

three-tiered processing architec-ture of the properties of the pro-ton of the properties of the pro-ton of the properties of the pro-ton o

d Equipment Corp. VAX 8000 and /785 minicomputers. Initially, Computer Sciences end ers wanted to download payroll do ordering information to massage to Lotus Development Corp. 1-2-3 spreadsheets for departmental re-ports, according to Tom Vollmer, manager of the Ingres and AT&T Unix applications. But before long.

repancies between mainframe and preadsheet data. For example, an end user might ut in an order for an IBM Personal Computer. Four weeks later, he dis-overs from the mainframe data base that his depar

it his department has been billed for for it.
"Before, he might not have caught the error, because fewer people have scoess to the paper in yourses," Vollmer says.

As a result, end users began to keep "two sets of books," one

to keep "two sets of books," one with their department records and one with mainframe data, which led to requests for capabilities beyond simply accessing the host, Vollmer relates. They now use the Ingres/PC Link to retrieve host information and drop it into 1-2-3 spreadsheets.

drup it lato 1-2-3 sprendsheeta, something that Voltmer calls "distributed access." As any market of technology matures, it becomes driven more by software than hard-nate that the state of the state of saabyst with Future Computing, Inc. in Dallas Pature Compu-ting Pedicts terminal emulation board sales will decline from \$725 million in 1988 to 845 million in 1980, and mero-from \$310 million to \$635 mil-lion over the same period. lion over the same period. Those links will not be the

stand-alone type commonly thought of today, however, she adds. "Most of them will be bundled into a system unit that you won't be aware of. They will be packaged dif-

ferently."

Personal computer and host soft-ware applications in the future will have a much tighter integration be-tween them, which in turn will stim-ulate demand for those software links, Young says.

"Cooperative processing between the PC and the host will not only dis-tribute the processing, but it will en-

'The first generation of micro-toainframe links got you across the telephone lines, but they didn't really get you into a data base."

- Richard L. Crandal

able the PC and the host to interact as peers rather than master and slave," she adds. IBM's Advanced Peer-to-Peer Communications proto-

slave, but adds. IBM's Advanced Percio-Der Communications proteon of about descript as a standard, crot-bo-hast applications.

"By 1900, those TC-bo-host con-botters applications."

"By 1900, those TC-bo-host con-botters are considered to the con

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e and to continue to pro centrally," says Larry cess centrally," says Larry Lammers, project adminis-trator for the Inland Contain-er Corp. in Indianapolis. "We just don't see the need to off-load work to the PC, then upload it back to the main-frame for further process-

I niand's end users next year will be able to create the work of the control of t

'Timely basis'

"I tend to believe that most large data bases are generating reports on a timey basis, and there's really no need for end users to access the mainframe data base."
Kibber says the emerging tompact disk/resd-ownpact disk/resd-over outle to you'de a safe and

concentration of the data concentration of the comported of the conformation between the comported of the conformation providers are carefully looking at putting a data base on a CD-80M plaster and distributing that weekly or monthly. In a key, for real-time access, the end user could use the CD-80M disk for all the data up to about two weeks ago and then access the last two week's worth from the maintranse. In search and retrieval."

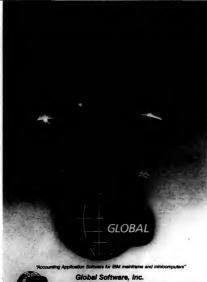
With the growing so-phistication of end acrs and the increased need o provide them with main-rame data, some program-ners are interested in devel-ping new applications with he end user's help, accord-age to be not seen and the resident and chief opera-age officer of Cincom Sys-man Inc. in Cincinnati.

"End users wounted the the programmer the ids and the logic they need order to query against d gain access to the corporation." Yab.

77

'By 1990, those PC-to-host connections won't be viewed as a bridge between two foreign worlds and as a battle between MIS and the end user. They will be more of an integral part of a homogeneous, cooperative and very versatile network configuration.





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ethned from page 155 nsky says. "Together, they come up th a prototype of an application at the end user tests. That way, the plication is built quicker and bet-Furthermore, sophisticated rela-tional query languages with ease-of-use front ends will enable end users to generate applications of their own, without the involvement of DP and MES managers, according to Yab-

lonsky.

As the software is fine-tuned, it will better handle the security concerns most MIS managers have today, Yablonsky believes. "It will still be

emotional concern, but the tech-ory is there to deal with the prob-"he says.

User communication in the networking era

Disparate products connect across a range of industries

By ELISABETH HORWITT

IS departments all over the U.S. are asking themselves same question, with increasing emence: "How are we going to all these different systems we've

a department or division head buying whatever system was best suited to a given task. But then the 1980s unb-ered in the era of interconnectivity, and those years of unbridled expan-sion came home to roost.

The new emphasis on networking extends across the full spectrum of industry sectors. Fortune 1,000 serindustry sectors. Fortune 1,000 service companies that increasingly per-crive information as a competitive weapon are installing enterprise net-works that enable users throughout the organisation to exchange infor-mation and share computer data and

In the manufacturing sector, For-tune 1,000 firms are connecting com-

puter devices in different work areas in order to achieve better quality control, lower investory and faster production cycles. And in research and development firms, users in-creasingly need to access data and peripheral resources on more than

"in the research world, it has been very natural for users to try one of everything interesting, and these say. "We want our systems to share data," says Daniel Lynch, president of the coasulting firm Advanced Computing Environments in Cupertino, Calif.



ing applications, Future Computing's Young believes, is the need to use what is already available. There is already a substantial amount of hardware out there, so the key to the growth of PC-to-host ap-

key to the growth of PC-to-host applications is to accommodate the existing hardware and software, while still allowing for growth."

Budget-minded should appeciate that philosophy, and it's one MIS strategists should appeciate that philosophy, and it's one MIS strategists should have no trouble adopting.

Besource Development's Kibler adds, "are add to cristented. They like to add to what they already have."



## Executive Report 1.000th Issue

In all sectors, the need to foster better communications among differ-ent departments, divisions and task entry of the sector of the sector of the ers' determination to use whatever vendor's personal computer, mint or mainframe best performs any given spelication. For example, Chase Manhattan Bank Corp., after exten-sively evaluating departments of sively evaluating departments of and communications products, decid-and communications products, decid-ed to let each user group choose ed to let each user group choose among Digital Equipment Corp., IBM and Wang Laboratories, Inc. prod-

hile this has made the users happy, it has put a major a on systems people, who have meet the disparate products

'We want a peer-to-peer, user-transparent backbone for transmitting documents and messages. And I don't think it will work if we add a burden of special command keys. The user couldn't care less where a document is - he just wants to get it.

network, notes Craig Gold president of consulting an

serent backt

ne for transmit-

ting documents and messages," Gold-man says. "And I don't think it will work if we add a burden of special command keys. The user couldn't care less where a document is — be just wants to get it."

iics expanded 3600 Series

winnings everything, the fastest run ess turn to Symbolics. Just ask Truck "During our practice runs at Indy this year, we went from 205 MPH lap speed to 234—just with a change of the small wings on the front of the car of \$700th of a degree. The Symbolics proton lets us maximize our

it wants to get it."
During the past half decade, con

puter, software and local-area net-work (LAN) vendors have responded to the interconnectivity needs of companies like Chase with a spate of proprietary network offerings and the much slower appearance of stan-dards that connect different vendors' systems. These can be divided rough-

systems. These can be divised rough-ly into three catagories:

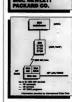
• IBM Personal Computer LANs.

• Third-party LANs that enable different vendors' systems to ex-change files and communicate in ter-minal-to-host mode.

• Proprietary minicomputer-based

systems.

Since each of these categories serves different user needs, true interconnectivity can only occur when there is an umbrella standard that links all of the major types of communications offerings. That is beginning to happen but is still some years off, SPI BN



analysts say. There is a definite dr ger, they add, that the gradual or vergence of the networking indust rgence of the nervous uld wind up at a single po (SNA)

It has been more than 20 years since le International Standards Organization first began developing. Open Systems Interconnect (OSI) as a model for universal connectivity model for universal connectivity model for universal connectivity began the same standards, only low-level protocols are defined enough to be implemented in commonly low-level products implement all seven OSI layers, they generally mean they have incorporated existing the contractive of the contra

all seven OSi layers, they generally mean they have incorporated exist-ing protocols and intend to add to chees as they become available. Companies that do not want to wait five or more years for a fully functional, multivendor communica-tions standard are turning to the pro-prietary actwork systems offered by BM, DEC, Data General Corp. and iBM, DEC, Data General Corp. and the rest. Five or IO years ago, most of the big system vendors offered primi-tive store-and-forward connections between minicomputers. IBM, on the other hand, was still

working the bugs out of SNA. Apart from the fact that it was difficult to and almost impossible to und ad. SNA had two big drawbaci



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Services (Quantification and a service)

## The coming of age of the local-area network

The first IBM Personal Computer local-an networks (LAN), following close on the heels of IBM's debut of the PC in 1981, were un impressive collections of cabling and interfahearts that enabled a regum of IBM PCs to side

peripherals such as hard disks and printers. While a few adventurous companies installed the early offerings of vendors such as Corvus Systems, lic., 500m Corp. and Nestar Systems, lic., the wast majority felt that any potential savings from peripheral sharing were offset by the expense and hassie of installing and maintaining

Man. Assect research firm International Data Carp. Count that 15,800 PC. Livis were shipped Carp. Count that 15,800 PC. Livis were shipped to the Carp. Country of the Carp. Country of the Carp. Country of the Carp. C

into such executions than occurred a free an interest to business seems to business seems to business seems of two standard network operating systems: 68-006 S. j. intendened network operating systems: 68-006 S. j. intendened present operating systems: 18-006 S. j. intendened with reconstruction. In the fail of 1994, and Netwar vendors of in November 1985 IBM PC activate vendors could then dividely two closes of their neckases that, by interfacing will

the network products that support either of g those operating systems.

• The appearance of powerful file servers that nt PCs concurrently access and update the same les — is contrast to early survers that just letsers store their data on disclosted. Roppy-size control of the second of the second of the urned PC LANs test viable departmental sysems, permitting users to share data and periberals and exchange electronic mail.

The emergence of gataways and bridges.

The emergence of gateways and bridges teways gave users access free to IBM Systems twork Architecture and recently to IBM Sysnyl Systems and the system of the control of the control of the control of the control of Companies on increase user productivity by king mainframe information available on A, axys Merv Adrian of the New York PC Us-

### Continued from p It required through a main

required that everything go hrough a mainframe host, and it did not connect many of IBM's computer nes—in particular, the IBM PC. The big system vendors' network-

The big system vendors' networking strategies have made great strides in the past few years. The mini vendors, DEC in particular, have come up with sophisticular, have come up with sophisticular, user-friendly office automation com-

SMA: WAND LABORATORIES, INC.



munications solutions linking a wise spectrum of products via LAMs. Internetwork routing, network manisterations of the control of the control of the control of the control of the interface and perchaper communications are among the network functions that users have demanded and does in the past few years. The departmental processor/miniscomputer office submentals to both an agained server for local work groups and alliation with corporate mainframes and other parts of the company.

The company of the company of

BM remains company.

IBM remains the laggard in this area. It still has a way to go before it draws level with DEC in terms of effectively connecting its various incompatible product lines, providing high-level applications for its recentive production of the providing the productive and producting a truly interduced distributed SNA architecture and producing a truly integrated OA strategy.

On the other hand, with IBB firmly entrenched behind it huge installed mainframe base, mos of its competitors have reluctantly concluded that they will have to conclude that they will have to the control of the contr



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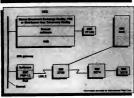
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make IBM connectivity part of their communications strategies. In fact, SNA and its offshoots, LU6.2 and PU2.1, may edge out OSI as the stan-dard of choice, according to George Colony, president of Cambridge, Most hard Versetter Bernard Colony, president of Cambridge, Mass. based Forrester Research, Inc. Now that IBM has joined Corporation for Open Systems, a wendor and user organization dedicated to promotization of OSI protocols, "It is likely that SNA will deminate COII all the way up to Level 6," Colony ayrs.

The best strategy for IBM's com-

petitors, he goes on, is "not to fight SNA but to use it as a pipe," since IBM's protocols provide application-to-application connectivity and other important functions that are still missing from OSL Applications can then be run on top of the SNA pipe-line.

he immediate benefits of wide-spread industry support of SNA is that users can have the func-tionality of a DEC or Wang office

" 'The bottom line is that, even if you wind up installing a lot of different communications chitectures, at least if they are well defined, you'll find some way to bridge them, whether you use SNA, OSI or a third-party vendor's product.'

networked to their installed base of ISM mainframes. Many customers have responsed exchangatically to the ISM and installed to the ISM and ISM accounts like Travelers Installed to Colony, "ISEC has moved to ISM accounts like Travelers Installed ISM and I eked to their installed base of among the companies that are consid-ering using SNA as a pipeline be-tween its disparate OA systems.

tween its dispurate OA systems.
Communications managers thus do
have some choice in how they formulate their strategy for the next, few
years. They can solve their connectivity problems piecemenal by adding
third-party vendor products as they

add new computer systems; they can wait for OSI, perhaps using Trans-mission Control Protocol/internet Protocol in the meantime, or they can adopt a multivendor strategy with SNA as the glue. Or they can remain glathful to one vendor's solution. That option is becoming less viable to many companies that are making communications a key element of their connective strategies. eir competitive strategies. Mery Adrian of the New York PC

Merv Adrian of the New York PC Josens Groupp provides a ray of hope. "The bottom line is that, even if you wind up installing a lot of different communications architectures, at least if they are well defined, you'll find some way to bridge them, whether you use SNA OSE of the whether you use SNA OSE or the summer of the thing I've learned in you can't tell users, what to use — you can only bello res, what to use — you can only bello ers what to use — you can only help them communicate."



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## Reaching higher levels of connectivity with TCP/IP

In the early 1980s, network ven-lors such as Ungermann-Bass, Inc., 1974 (See Manufactions, Inc. and Ex-stan, Inc. began introducing net-stan, Inc. began introducing net-toric interfaces and servers designed o meet the needs of manufacturers, search and development firms and their companies whose users often receded to access multiple hosts from

needed to access multiple looks from different wendors. These products typically inter-laced avantey of youtens to a broad-tion of the product of the con-supported some version of Ehernet, along with the theo-dominant com-munications protocols: Digital Disple-ment Copy. Bened. Here Copy. The Copy of the Copy of

which commissioned the pro-ing the property of the pro-lines that TCF/IP be used by the of the the TCF/IP be used by the of wing among research and devel-ent firms — and thus among the artily Unit-oriented vendors that computers to R&B firms. The big spread of TCF/IP began Berkeley 4.2 Unitx was re-d, and everybody and his broth-ale pruting it into their boves,



says Daniel Lynch, president of the consulting firm Advanced Computing Environments in Capertino, Calif. Like TCP/IP, Unix 4.2 was backed by the Defense Department. "So people said, 'Hey, we'll take what's avail-

and, May, will take what's with plant age. Lyches age. Amount 1844, TO/FF was adopted. Lyches age. Amount 1844, TO/FF was adopted and fridge, which and stretches in both the connected and province and fridge, which and stretches in both the connected and province and the connected and the connect

tioning the fact that it is primarily this beam," the says. The salvers!— When the says the salvers!— The salvers!

will eventually adopt the Open Sys-tems Interconnect (OSI). Adopting TCP/IP "would make us keep to the connectivity schedule of small computer vendors that implemented Unix and a C compiler rather than large companies like IBM or DEC,"

Metre notes.

At the recent TCP/IP Vendors' Workshop in Monterey, Califf, a vendor coalition was formed to try to iron out incompatibilities, develop applications and, in general, discuss how TCP/IP can become a more suit-

77

'The big spread of TCP/IP began when Berkeley 4.2 Unix was released, and everybody and his brother began putting it into their boxes.'

## scape the nightmare of pulling to terminals



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stands, diddaes under its not technical probavial communication on of the iran an apple it crision MICS con the vidal and comprehens (4.18 Maria cincin System Ha apple mans all fit together two because that what MICS exill about?

## Father of PC dons new hat studying medicine

By DAVID BRIGHT

A fter keeping a low profile for nine years, Ed Roberts — the father of the personal computer — in

tion and

ms (MITS) Altair, now keeps usy juggling two careers: medicine ad computers.

and computers.

Currently a resident in internal
medicine at the Medical Center of
Central Georgia in Macon, Roberta
also recently founded Datablocks,
Inc., which makes real-time personal

Aiding the handicapped

Affinitg the handlesqueed While remaining involved with Datablocks, Dr. Boberts hopes to open a private practice in a rural ways of drawing upon his medical and technological backgrounds to help the handlesqueed. The remaining handlesqueed in 1609, Boberts spent 10 years in the U.S. Air Picrot, secring has degree in electrical engine engine properties of the properties nsistorized radio transmitters and hts in their spare time, which they d by mail order to model airplane

They incorporated MITS in 1969 and in 1971 made a name for them-elves by producing in kit form one of first large-scale-integration-programmable calculators.

But after encountering tough com-etition from larger companies, MITS ound itself \$350,000 in the hole in found itself \$350,000 in the hole in 1974 and moved on to its next chal-lenge — making minicomputer power available to the average person in an affordable system. Roberts designed the machine around intel Corp.'s 9000 misconcessors with 8080 microprocessor, with memory expandable from 256 bytes to 648

bytes.
"We were down the tubes at that
point," Roberts recalls. "We went to
our banker and said, 'Look, we've got
this product that's going to come out,
and we think it's going to do really
great. You need to give us another
\$65,000."

865,000."

MITS managed to obtain the moncy from the bank. Heralded as a
breakthrough, the Altain 8800 appeared on the cover of the January
1975 issue of Popular Electronics
magazine. The first machines soid for
a price of \$257 without a case, \$396
with a case, and the response was totailly unexpected.

### High MITS dem

At that time, Steve Womiak had yet to build the first Apple I, and the announcement of the IBM Personal Computer was more than six years away. However, MITS was immediately defuged with 4,000 orders. With the help of Bill Gates and Paul Allen, who wrote a Basic interpreter for the Altair, MITS sold some 30,000 throughout the

claims to have been the one to coin the term "personal computer."
What is now Pertec Computer Corp. bought MITS in 1977 for 86 million, and a year later it ceased production of the Altair as the market became more competitive. The Altair's bus lives on,

erts, who detecte popular micro PIONEERS however, as the S- 100 bust, around which a multitude of systems have been built.

Based in Glenwood, Ga., Roberts'
new company introduced its first
product, the Altair-II Personal Con-trol System, last July. With a set of
over 30 stackable hardware building

according to their particular apption needs.

The range of potential applicaronmental control, robotics and pro-

Roberts is also investigating the feasibility of building a sophisticat-ed, voice-actuated wheelchair for paralyzed persons. Another possible project is finding a way to help muscular dystrophy victims take advantage of their intact central nervous systems.
"I enjoy what I'm doing," Roberts

Ed Roberts, Detablocks, Inc.

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in many additional ways. With INTELLECT's PC Link, they can ask questions in English on a PC. have the results from DB2 reformated into a Lotus 1-2-3 worksheet, and sent down to a PC. And, advanced work in Al provides voice input to your DE2 database

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## Micros in MIS: A tiger by the tail



### By DOUGLAS BARNEY

t was more than a decade ago that the once-lowly microcom-puter was born. On that first arrival, many called them toys. They were not only difficult to use, but also lacked power. Ran dom-access memory was mea sured in bits, not bytes, packaged applications software was nonexistent, leaving most MIS executives unimpres But despite its relatively qui-et birth, the micro has shaken

et birth, the micro has shakes the very foundation of data pro cessing and captured the imagi-nation of an American publi-that had never felt comfortable with computer technology.

"People are going PC crazy notes Recy Dunn, director of ad-minstration services/MIS at Big

## 500 firm based in Houston

Already microcomputers can access data bases of more than a gigabyte on optical disks, act as multiuser platforms, connect with a variety of host and departmental processors and, in some cases, even replace expen-sive mainframe installations

in sight.
Microcomputers are not only getting better, they are getting

Lower compon rise of an IBM standard for PCs have allowed a myriad of manufacturers to survive and drive prices down. An IBM-compatible of data can now be had for as little as



\$365 through mail order. "It is almost mind boggling how this is happening and how these peo-ple are staying in business," says Fred M. Zickert, manager of personal computers for Eaton

Corp. in Cleveland.

The low price of microcom uters has led to a proliferation of applications. For example, an IBM Series/1 PC allows Sam K. Leming to run minicomputer software on a lower cost ma-chine and thus distribute processing to more users. Leming is DP manager for Kroger Co., a nationwide chain of pharmacies and supermarkets. "We can put a PC in there, and the support is the same as that for the Series/

1." he says. Low cost is just one advantage of microcomputer technol-ogy. While a mainframe might take up an entire air-condition-ed room, micros generally re-quire a portion of a desktop. And while mainframes may require a staff of experts to keep them up and running, micros can be piloted by a novice

Micros can also act as a vari-ety of terminal devices and even processors through various software and hardware products. "Emulation boards make the PC the ideal workstation for everything," Leming says.
"The communications facili-

es are what really moved the PC into data processing. The terminals have gone away; the PCs have replaced them. We have a dual-function machine. and it is doing the job very well." Eaton's Zickert says.

Despite their constant in-crease in capability, micros keep getting smaller. Transportable computers, many with hard disks and built-in printers, allow users to compute on the road and use the same machine for home and office use. Laptop computers go a step farther and allow computing on airplanes. In the woods or on the desk. Hand-held computers

Microcomputers have shaken the very foundation processing



We used to have a running joke, "I want a Cray micro." By God, you will have one one of these days, probably in your rest pocket, and it will have unlimited memory."

computer revolution. The performance of microprocessors is now measured in million instuctions per second (MIPS) and potential addressability in gigabytes. The main thrust of this power will be to provide a quantum leap in the capability of single-user workstations.

Mirso based on the Intel Corp. 80386, running at 4 of 46 bytes, have already hit the market, and machines based upon the Motorola, Inc. 68020 and 68030, the latter of which runs at 8 MIPS, are el-

Monothia, Dec. 60070 and 60000, the form of the translated or the

Optical comparison (Control of the Control of the C

But problems are certain to emergie with the quickening pace of hardware technology. "If I have 100 terabytes of storage and I put that much data out there, how do I find It when I want It! Typing to I find I are coord in a 100-terabyte disk is like identifying a grain of sand somewhere between Earth and the moon,"



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ointment, however, enbak-1 took top hon-

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## John Blankenbaker: Inventor of Kenbak-1

stem that had ed at MIT.

quotron in 1965 and retired two years later. Now he plays the stock market from his home in Chadds Ford, Pa., and says he has barely touched a computer in the





omputer projection systems allow you to project data and graphics from your terminal or PC directly a large acrees. As a result, you can live, real-time computer information for cry from yestersky's able or

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## Managers wait at crossroads of 80386-based technology

### By DAVID BRIGHT

nal computer strate the 32-bit 80386 mi

primaria consideration of the primary primary consideration of the primary

'This is the most difficult time we've had in years.' Questions about the market have no

clear-cut answers.

For planning, "Usin is the most off. front time we've that in years and front from we've that in years and recompanies of the planning of the not rule out the possibility of the Compan system being better received

than the IBM system. The PCET industry commit
boasts some 65 members, includi
representatives from ROM BIOS so
plier Phoenix Technologies, Lt
Emulex Corp. and Olivetti Advance
Technology Center, Inc. Its propo
for a 32-bit bus extension could cat
on, but many observers are quick
point out that the marketplace, a

committees, sets standards.
"We're going to sit on the sidelines
on that issue and wait to see in what
direction the market goes," states Ed

		F 700 4	
See and the second	9000/96	80386	80306
Internel Architecture	8/16 bits	16 bits	32 bis
Address Size (in bytes) Physical Logical	IM IM	16	40 647
Number of Translators	5,500	134,000	275,000
Relative Perfermence	(at 4.77 km/s)	(M. S. MPM)	(MX 16 MPA)
Modes Supported	Red	Real Protected	Protected Virtual 86 Native
Multipolited Support?	100	Yes	Yes





## Unix operating system taps Intel effectively

LABELING RECOVERY DATA CHECK BLOCK MODIFICATIONS AND SCAN OR BLOCK MOVATION

DATA PROCESSING

Continued two page 175
Juge, director of marketing planning at Tandy Corp. When Bild enters the market, we'll know "marketing planning the tasks," with the product of the tasks, with the primary personal computer chip through the rest of this decade, Juge notes.

The production of the primary personal computer chip through the rest of this decade, Juge notes.

The production of the primary personal computer chip through the 2015 personal properties at classic case of hardware controlling software. Although the 20150c can address 1610 lytes of 20150c can address 1610 lytes of address 46 lytes, the current version



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While many managers about buying 80386-bas at the present time, they us look at the

We're still trying t 80286," remarks tager of office a s John Sykes, on at ger of office automation at nis Crest, Inc. As a construction ingineering subsidiary of Com-on Engineering, Inc., Lummis in Bloomfield, N.J., currently entits IBM FC XTs and ATs Common transportable systems.

## Compaq transportable systems. No great need for 386 now

"When IBM comes out with one [an 1386-based system], we will have to aluste our long-range planning to e how the product is going to fit, "Sykes acknowledges. "But right we there's no screaming need for it to 803861."

kes says the same thinking ap-to 80386-based accelerator is, which are said to double the piles to 5000-based acceleration about the control of the control

nology.

Given the higher prices of 80386-based equipment and the lack of complementary software, some managers say that if they need to run more powerful applications, they can often tap a hidden resource: the same minicomputers that the 80386 is predicted to rival.

"I don't want to break the bank," tes Russ Heilman, who runs an in-mation center for Wisconsin's Dent of Industry, La

Before putting out additional me ey for 80396-based systems, Heilm says he will first look to his depu-ment's VAX superminicomputer needed power

### eting system so In addition to a hardware sta

an audition to a nardware stan-dard, what's sorely needed in order to give 80386-based PCs a boost is ad-

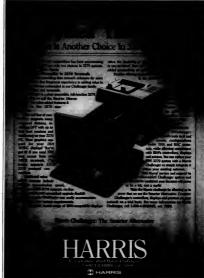
to give 80x90-0seed rt.v a boom is no-vanced operating system software. Although 80386-based hardware can essentially put the power of a su-perminicomputer on a desktop, the MS-DOS operating systems currently available for PCs simply cannot har-ness that power. For that matter, even the 80286 is not used to its ful-

Like the 80286, the 80386 at ports multitasking. But in addition the 80386 has the ability to run se eral operating systems at once -whether they be MS-DOS. Unix or patibility with the 8086, 80 80286, the 4MIPS 80386 can a

es of main memory, the sions of MS-DOS put a 64 sent versions of MS-DUS pur a osus-byte limit on the amount of memory that can be addressed. Microsoft is working on the next version of MS-DOS, which will support multitask-ing and eliminate the 640K-byte bar-

rier. Selected applications developers are currently testing the new MS-DOS, which should finally be released in 1897. The new MS-DOS is being designed to run on 80286 and 80386 systems, as the 8036 and 80386 systems, as the 8036 and 8038 on or support multitasking. One can only guess as to when a DOS that takes advantage of the 80380's extended capabilies will be available.





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color Statismentician will research and develop-mental software for scientists and numerical analysis. optionals must have a Ph.D. in indehensition or physics or physics work experience. Experience in the areas of mental solution of differential equations, integration, nation approximation, losser algebra, and special fund-me is neglinic.

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# The price of success: IBM 370 system just won't die



IBM is unlikely

to scrap the 370

architecture in

the near future

#### By JAMES CONNOLLY and JEFFRY BEELER

he key term was common architecture, which meant common peripherals, common software and common operations staffs. More than two decades have passed since the laumch of the earliest major effort to produce a single computer architecture for all types of users. The protrived from the concept of serving everybody. To IBM, the 360 stood for all degrees on the com-

The IBM 360 was the first of a series of processor families, including loday a 3500 and 4500 product lines, that are collecture makes the series of the seri

#### ....

There are few common elements from the System 360 models announced in 1964 remaining in the 3090 Model 400s that began shipments last summer. But IBM officials boast

> that software written for a 360 can still run on a 3090, and for those two decader IBM has servec commercial users engineers and scientists with the same types of sys-

> > IBM has maintained that commitment to a com-



el, for more than the 20 years that the company originally hoped for Surpassing that 20-year mark raises the question of how much longer IBM can stay with that 370 architecture.

In addition, while IBM has solved some compatibility to solve some compatibility to computing buttiens, now markets—markets for computers that were almost nonexistent 20 years ago — have raised questions on how IBM can provide compatibility. With the recent introduction of its 3970 low-markets are solved to the solvent of the solvent

mance range.

To complicate matters still more, each architecture has a different means of dealing with personal computers — another type of computer that did not

exist 20 years ago — and word continually leaks out of IBM about engineers working on new architectures, ways to merge architectures and ways to package mainframe technology in still smaller boxes.

still smaller boxes.

The lack of low-end and midrange compatibility has made
IBM a target for vendors such as
Digital Equipment Corp., which
claims to offer desktop to highend supermini commonality.

#### 'All points on a compass

"The 360 was a machine useful for all applications, all points on the compass. To a close order of approximation, any program that ran on any 370 will run on today's 370s. If you had a Fortran compiler that you developed in 1865, you developed in 1865, you can be seen to the seen of the seen o

uting world was vastly dif-remet than it is today. Case cloths to an IBM Fersonal computer in his office and typ with a laugh, "Yon'd ick a personal computer to ick a personal foll hid that he only thing 1401 had that are better than what this de-ton on my delle has was a with the 350, IBM intro-uced a line of peripherals, ut it was with the 370 an-cuncement in 1971 that IBM stablished standards for eripherals that remain in

rement in 1971 that IBM lished standards for herals that remain in sday. With the 370, IBM faced the 3330 disk with three times the city of its predecessors, 1970 template which 70 term 24 line Ser 12-li

ulia.

Valide the 360 introducis acknowledged to be
ortant because of the
gatibility, the 370 was
ortant because it opened
the world of virtual mem-

creational Data Carp.
Voce President John Hart.
Voce President John Hart.
Of Gering a long IBM sales career, notes that General Executive Co. beat IBM to market with its frest virtual system, and that IBM then almost vernight developed the 350 toda IV with virtual secondificien as expendificien as expenses.

the 2TA, a system on which with all storage was a prime selling point.

The move from the 250 on the color of the color of

the virtual capability c bined to support the inte tive processing that becau popular during the 1970s

The real gamble

But Hart notes that it was the 360 that was the real gamble. "With the move from where they were to the 360, IBM almost bet the company on that one. The attempt to have a new architecture, new tware and new tech es all coming together same time was a m many

**Executive Report** 77

The common peripheral interface spawned an industry, a plug-compatible business where start-up companies could design peripherals, secure in knowing they would not be made obsolete by IBM's next mainframe announcement.





ans for the 360 fai ch as new 7000 syste at if they were to go al but if they were to go and with the architecture a software for a 360, it would do no good if the was no new chip on which implement them.

"Initially, it was tough siedding. The customers en-braced the 360 conceptually and they supported IBM in the idea of a compatible family. But in terms of hardware and software, there were lots and lots of problems."

Some systems had to be to-

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The attempt to have a new

tally repopulated, with all boards replaced in all models of a line. Compatibility prob-lems did arise with having

time did strice with having to the control of the c

ase points out that not all of the 360 custom-ers made full use of the new architecture immediately. He

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## Glory days: Recalling the shift to a single IBM architecture

Participants agree current dominance began with 360

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says that emulators that allowed 360 customers to run programs from the older systems sold well. "The 7080 emulator ran at a 1-1 ratio, while you could have gotten a 3-1 ratio by running as a 300. But somehow we sold twice as many emulators as we sold of the original 7000. Those emulators allowed people to mote that come people used emulators for the control of th

#### 370 scrapping unit

Hart, Case and Jack van Kinsbergen, a member of the 1961 360 team and now president of Boole and Babbage, Inc., concur that IBM is unlikely to scrap the 370 architecture in the near future, at least not in the way they dropped the 1401 and 7090 in Case notes that even if IBM did introduce a new architecture, emulatoduce a new architecture, emula-

luce a new architecture, emula-would be more important than

ever.

He also speculates that if IBM ever introduced a new architecture, it would continue to support and enhance the 370 machines.

Van Kinsbergen says that while the architecture has expanded to accommodate concepts such as multi-



ssing, the design will stretch further to support features such availed processing and other

rt adds, "I think that what IRM
ng to do in stay with the basic
rchitecture while looking at trycome up with a new, more user-

there."

When asked if IBM succeeded in ta goal of offering a top-to-bottom compatible architecture, Case notes that the 360 line failed to extend far mough down to he affordable to come potential customers at the low md. But he says that it was successful otherwise.

the also looks at the minicom-arens and adds, 'As it turns BM lost everything they once red in terms of compatibility to they have now proliferated of the familie."









ctragraphics, we've always spany philosophy of not ju but thinking ahead. It's a to strive for. And it does in just sound nice in our

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# Recalling 18 years of dramatic DP changes

By DONNA RABIONDI

W hen R. Edwin Earle

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cessing to do unit with ans each obsticionary.

The Burroughs Corp. 18900, on which Earle cut his computing teeth, had to be programmed in either assembler or machine lunguage. "What programming went from rey low-level languages, wery close to the machine, to high-level, fourth-generation tools," he says.

The tools Earle's programmers use

Earle has worked for the last 4½ years, have taken the drudgery out of coding and made maintenance and code changes easier.

"Back in '86, it was almost impossible to debug somebody else's code,"

Earle says.

In the past, MIS managers would un out of computing power and just rider another machine, Earle says, last now, decisions are made on fi-ancial as well as technological seen. "We lease far more machines, and we lease them for much shorter eriods of time. What we try to do now is remain flexible in terms of be-ne able to channe."

now is remain flexible in terms of be-ing able to change."

American Express already has an IBM 3090 Model 400 — with 128M

ISM SOUD ROOMS OUT - WITH 1200 bytes of memory — up and running and another sitting on the loading dock, Earle says.

"It's kind of crasy. That machine is just now becoming generally available, and we are talking about whether we really want to have a four-year lease on it... We want to have a four-year lease on it... We want to have a four-year lease on it... We want to work the positioned in 1900 to be able to

be positioned in 1990 to be able to change in case some newer technology comes along." The importance of the computer system to the company has certainly changed during Earle's career. "American Express has probably 8,000 to 10,000 employees who cannot do their job if we are down, whether the problem is with the disks, CPU or data base." Earle says.

#### Regulres 99.8% uptic

The employees work on-line answering card holders' questions, calling card members whose payments may be past due, resolving written correspondence and making sure American Express is complying with all its written rules and regulations.

all its written rules and regulations. The company requires 90.9% aptime to a rough the financial catastrophe of having its workers idde. The time of the financial catastrophe of having its workers idde accounting processes. It was all batch processing, "Barle says. Back then, computers had eccese capacity in the daytime and were bound up at night to all the hatch."

Today, computers are used most avily on-line in the daytime and

savily on-line in the daytime and we excess capacity at night. "Twenty years ago we crunched imbers. Today we provide informa-no to people who look at that informa-tion of the control of the control of the retarting to look at artificial inne-igence and expert systems to capture e decision-smaking process and infinishe the middle step. Whether no two actually accomplish that is 10 open question, but I see it as the re hearton, Taber says.

Hardware reliability in 1986 is al-ost unbelievable, Earle states. "If ar system goes down once a year ow, that is a lot. Eighteen years ago, now, that is a lot. Eighteen years ago, the system went down once a week, you were backy."

In tage drives, IBM 3460s are 10 times more reliable in temporary read or write errors than IBM's 3420s, Earle says.

But that is just a recent change. Tage technology has changed the peripherals issued of all, he says. Until the 3480 cartridges became available.

# THE SPEED. THE POWER THE PERFORMANCE.

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### The only 386 accelerator board that works in a PC, XT and AT.

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Comband two page 151
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hardware to sustain his organization
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Model 2000 and one 2004.
House 2004 are to be a page.
Here's no way! I could really do it,"
he says. "There would have to be
like changing wendors.

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Like Owen, Kasten et Americas States Insurance expect sevolutionary changes. "Drolution you can one with, like you to read software or you with, like you to read software you plan and schedule them. But you can't change 25 years of software do-velopment, and why would want to A similar opinion is expressed by John Wolfe, director of advanced dried and the property of the pro-port there? I be minor changes that would be transpersed to the users, a compatibility mode for a number of year." Like Owens, Kasten at Am

years."

The Windsor facility is one of three Cigna data centers and it houses a 3000 Model 400, a Model 200, four 3081s and one 3084. When asked what it would entail to convert this installation to a new architecture, Wolfe said, "I have absolutely

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list year, tapen had stayed much the
Disk drives, such only to store the
operating system in 1560 because of
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with almost 156 bytes, has

Managing the computer center, formerly the province of technical staff who came up through the ranks, is now accomplished by people with MEA degrees who often have to be trained in technical matters. "We be trained in technical matters. "We don't manage the purely technical like we used to," Barle says. "We tend now to manage work flows, scheduling, process controls. Things that take general business manage-ment skills as opposed to technical skills."

The man as opposed to extended.

Dren the end user has changed.

"At American Express, we have a fairly sophisticated end user who understands what the machine can do. after the control of the control

#### 77

# Evolution you can cope with, but you can't change 25 years of software development. And why would I want to reinvent 25 years?"

- Karl Kasten rican States Insurance Co.

"It would be unbelievably costly," he added. "We have millions and mil-lions of lines of code. The cost would

be astronomical etheless, Wolfe acknowled that the current hardware "is really being pushed" and he says he is hop-ing IBM will make a technology leap We are looking to some very big

and the co ware probably can't grow that big."
Wolfe says. "We're hoping that IBM
finds a way around it, and I have a rtable feeling that it won't be a

Of the group of data processi ofessionals interviewed, one us nardware services manager at Se-rity Pacific National Bank in West-nster, Colo., says he would wel-

come a major architectural change "I think it's inevitable," Security Pacific's David Hefter says. "At some point in time, we'll have to bite the

Hefler says he is waiting for a

sinframe-based image processing stem from IBM to improve check occasing at the bank. Hefler works at one of Security Pa-

Hefler works at one of Security Pa-cific's data centers, where a 3090 Model 200 and two 3081 Model its are used primarly for check processing, "We're talking a major rewrite, but at some point in time, we'd have to make the decision to do it," Hefler says. "It would be a massive, insolve job, We do more than a million checks a day. But changes are inevitable. You expect changes. That's the na-ture of the business."

#### GRF **VPF** F-5(





#### By DAVID BRIGHT

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re time as a fire officer, bicy-ound in caves"

MICRO PIONEERS er a mysterious rock
sists at the bottom of a casyon. "We
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orry about it," he jokes. From his
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such with the rest of the world
rough a Help hottles for specific
spile Computer, lac., products, on
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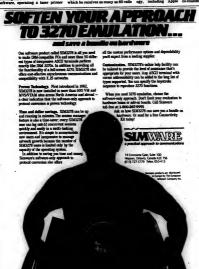
by Controls and The Applications of the Section of

### Micral maker opts for optics

In 1973 Thi T. Truong designed a low-root computer around Intel Corp.'s new 8008 microprocessor. Truong, who was born in Vietnam and raised in Franco, intended the Micral to replace more expensive minicomputers in lower performance applications. The system achieved fair measure of popularity in Europe,

#### MICRO PIONEERS

MODERATES IN THE WAY AND A STATE OF THE WAY A



# Faith required to invest in productivity

ffice computers have enhanced the productivity of American esses, even if it can't be proved conclusively.

That's the view of experts in the use of information systems questioned on the debate over what benefits businesses in the U.S. have reaped from their huge investments in office auto-

That ongoing debate was heightened earlier this year with a cover story in Fortune magazine that claimed the payoff from hundreds of billions of dollars of investments in office computers by American compa-

computers by American nies has been "puny." The article cited an econo-mist's calculation that white-collar productivity in America hasn't advanced since the 1960s. It went on to suggest that the major benefits of office computers lie farther down the road, when business procedures are changed to take full advantage of the equipm

Several academics and con-litants surveyed on the issue rongly disputed the conclu-on that office automation has ade significant contribu-o productivity, although tions to productivity, although they agreed that technologies have been oversold and that opal use of them will come with more funda

We have a real managerial challenge on our hands.

changes in the fuing piece of re-search, Stephen S. Roach, a senior economist at the

information systems specialist at Harvard Business School. New York investductivity has been stagnant.



ley & Co., attempted to isolate the change in white-collar productivity in American business from the overall productivity trend reported by the federal

In both the service and many facturing sectors of the econ my, "productivity is essentially flat for white-collar workers vis-a-vis the 1960s," says Roach, whose work played a prominant role in the Fortune article.

While he concedes that the impact of computers on productivity cannot be me sured directly, Rosch concludthat there is powerful evidence that, overall, computers have not generated a payback in imoved productivity.

Roach concedes that there have been exceptions in some industries, such as financial ser-vices, that have been offset by failures elsewhere. But even the results have been mixed, he says,

Other observers also question the benefits of some applica-tions of office technology. "Anyone who uses an electron mail system has to ask himself whether all that communication is really worthwhile. Is it bette or just more?" asks Michael Vitale, an assistant professor and

But Vitale strongly disputes the view that white-collar pro-

"I just don't agree with that argument. My feeling is that overall productivity definitely has been improved in terms of output per input," Vitale says. And computers have played a role in that gain, according to

"Look inside any large insurance company or bank, or Har-vard Business School for that matter. You just don't see as many clerical heads as you used to, "he says.

Others agree that office computers have enhanced produc-tivity. "They obviously have. Anyone who thinks they haven't doesn't understand how offices work. They're trying to trade on the fact that you can't put a number on it," says William Zachmann, corporate vicepresident for research at Inter-Data Corp. Framingham, Mass.

#### Users' OA goals

Experienced users of advanced office automation systems look for their equipment to improve the overall performance of a department or organization, rather than the productivity of individual workers. says John J. Connell, executive director of Office Technology search Group of Pasadena, Calif

Measuring improved perfor-mance can't be limited to reducing expenses, says Connell, lose organization is made up of corporations that use advanced office systems.



LEASAMETRIC

do apreadaheets."
Both Roach and those who dispute a view that there has been a miniall return from office computers the tester of the tester toward ore profitable use of the equipment. Solutions don't lie in supposed maceas like networks or fiber op-

Several academics Several academics and consultants strongly disputed the conclusion that office automation has not made significant contributions to productivity, although they served

ithough they agreed that technologies have been oversold

and that optimal use of them will come with more fundamental changes

in the future.

"Hello, I'm Lisa Metric. Whenever, wherever and however you need DP equipment, you'll never need anyone but me."



es but in "figuring out how to use een to do what you want to do,"

### The gains of automation are here, but who can count them?

#### Rapid changes afford little time to adapt

#### By NINAMARY BURA MAGDINIS

Chrysier Corp. MIS Manager Joe Coletti is quick to say his com-pany's employees are more produc-tive now that computer power sits on most workers' desks. But, he readily concedes, quantifying productivity leaps made over the last 20 years is impossible.

leage made over the last 20 years is "I don't have the statistics to grow it. I'v. difficult to quantify provisories of the provisor are buttled, of daily business operation, he created pulling the provisor of the provisor

'There's a huge river of information pating by, and you don't want to drown in the river. You want to pull certain items out of the river and take some action that is meaningful.

there are no companywide statistics to corrobovate productivity gains. Prillips Petroleum Information Services Manager Jim Octardi echipe services Manager Jim Octardi echipe services Manager Jim Octardi exhe manager through the manager through th

Difficulty in measuring productivity can be stributed partly to the Difficulty be stributed partly to the 200 years, measures are supported by the productivity of the

ddenly, end-user computing at on like wildfire, leaving very

little time to adapt or to measure changes. "MIS first pushed informa-tion systems to end users," Coletti re-

anges. "MIS first pushed informa-on systems to end users," Coletti re-ils. "All of a sudden the end user came impatient with delays and anted more information systems." ad-user computing improved pro-ctivity instantly while also pre-ctivity instantly while also pre-

ductivity instantly while also presenting new problems, he says. Phillips Petroleum's Gottandi says. Phillips Petroleum's Gottandi says increased. "I think we all knew keynuch cards would have to go in order for more efficiency in data processing. Totalay, an awful lot of data entry will be done by the person who is originating the data. In the 1960s, that person would have filled out a

form and sent it off to be key-punched."
"Today we have thousands of peo-

ple who work daily with computers, observes Deering. "There are so many basic applications that we take for granted. Everybody's been im-

Even with info pervasive presence today, it is impo-tant not to install them for the sal tant not to install them for the sake of having them, Deering says.
"Our goal is to take data and put it into a meaningful form and give it to our users. There's a huge river of in-formation floating by, and you don't

Looking to the future, an distributed processing spreads, departments uning computer technology have to avoid becoming ministance Will organizations, according to Chrysler's Control as a conservative months of the control as a conservative movement to also down on the control c

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# Have you resisted getting a factory management system because your manufacturing needs are a little out of the ordinary?



tween St. Louis and Chicago. In 1982, the Modified Final Judgement of the 1956 Consent Decree between AT&T and the U.S. Justice Department set in motion the divestiture of the world's largest cor-

"The single most important event was the Carterfone decision. It allowed users to attach their own equipment to that of the phone company," Hynes says. After Carterfone, Continued on page 202

### Telecom managers grateful for the options of competition

#### By STANLEY GIBSON

orty years ago, even an expert as picking dark hornes would have hesitated to bet that telecommunications management would one day rise to join the most important of corporate departments. But telephone industry deregulation has grabbed it from the shadows and have been applied to the shadows and the shadows are shadows and the shadows are shadows and the shadows are shadows as the shadows and the shadows are shadows as the shadows are shadows and the shadows are shadows as the s

As recently as 20 years ago, telecommunications management was a tranquil realm, with one supplier and a captive market. The sole supplier, AT&T, dictated products, services and prices. Telecommunications

managers either ordered or didn't.
Now, telecommunications managers are free to choose, and that has made all the difference. Telecommunications managers gain prestige by saving money and improving performance in a realm that is of strategic importance to their company.

Prince Dyess, telecommunications manager for the Scripps Clinic in La Jolla, Callf., and president of the Tele-Communications Association, says, 'It makes my job a heliuva lot of fun.

heliluxa lot of fun.

"Before, there was no choice and no decision. The only question was, 'Can you pay for it?" The analogy in the computer realm is a world with only IBM and no Control Data Corp. or Digital Equipment Corp. And the vendor is protected by the federal and state governments," Dress

stresson.
"It's better now. It was very frustrating then," says lob Hynes, teleconsumications manager for the Loc Angeler Tisse. "I want veally happened to be the local transport of the local transport transp

sive to buy almost all the time."

Hymes agys. ... Beginning in the hist 1940c, the
Beginning in the hist 1940c, the
Beginning in the beginning industry the
regulation have proceeded incorribly. In 1940, the U.S. Department of
Justice filled an antirust sail against
ATAT, asseed as splitting it from its
ATAT, asseed as splitting it from the
Bectric Corp. That sailt resulted in
the Consent Decree of 1966, which allowed the telecommunication for
to loop Western Excite, but prohibto loop Western Excite, but prohibcentsing business;

ited it from entering the data processing business.

In 1987, users gained the right to attach their own equipment to the phone system when Bush-a-phone Corp. won a suit against AT&T. In 1968, the Carterforse Communications Corp. decision expanded the rangle of devices that could be con-

AT&T lost its monopoly of the private line market in 1969, when the Pederal Communications Commission allowed MCI Communications Corp. to serve as a specialized common carrier, offering private line service be-

77

Before, there was no choice and no decision. The only question was, "Can you pay for it?" It's like a world with only IBM and no CDC or DEC.

> - Prince Dyess Scripps Clinic



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Take it to the limit. NEC

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Beginning three years ago, companies had to manage their own networks. Just as corporations had to take responsibility over their own computing beginning in the 1960s, now they have to take over telecommunications for theme-tree."

— Lional Gillerman

e to keep abreast of to

ices Co. in

ginning in the 1960s, now they have to take over tele elves," he says.

Although they now find hemselves in the vortex of high technology, many tele-managers

a seconosogy, many tele-armanications managers ared the field almost by tance in quieter days. "Al-st all of us got into it by ident somehow," Hynes says.

Today, in contrast to earli-er years, a specialized educa-tion in telecommunications

nagement helps aspirants or the field. Veteran pro-sionals Gillerman and nes both teach courses at

Hynes both teach courses at the university level.

One of the issues they try to impress upon their stu-dents is the need to communi-cate the strategic importance of their field to their corpo-rate leaders. "In a lot of orga-nizations, there seems to be difficulty in making top man-



gement aware of the strate-ic implications of telecom-sunications," Gillerman : implecations," Gillerman ya "In the past, if you seded a telephone, you or-ered one. Now it's part of a """ of corporate sys-

complexity of corporate sys-tems."
"It's important to become part of the long-range plan-ning within the corporation — sating the need, the im-portance, of telecommunica-tions within the company, says Sherryl Figurico, for walt Disney Pictures in Bur-bank, Calif. "Most of all, we need persistence in getting ed persiste message a

yess, however, says the trend is to over-come the pitfall of being en-palfed in corporate bureau-

eays. They know the amount of money spent on telecommunications is very large, but they also know it saves money for the compa-ny."

And that bodes well for career advancement for tele-communications profession-als. "You see a lot more tele-

ee years ago, to manage the works. Just sa corpo respon works. had to wer the

ther issue facing telecomms smanagers is the increasing on of voice and data comms, a trend which has b heralded, but which has b

widely heralded, but which has been low in arriving minegration was a eatly hot go-word for a while. Peo-eatly hot go-word for a while. Peo-le want to learn about it, but it's suly applied on a spotty basis. There are many good ways to still use voice and data esparately without combin-ing them," says George Shriver, man-ger of telephone inventory systems ger of telephone inventory systems

he arrival of Integrated Ser-vices Digital Network (ISDN) uld hasten the combination of or and data, although it, too, has n slow to emerge. Hynes, like ty, predicts the eventual arrival ISDN, although he sounds a cau-

pay for it," he main

nmunications user is er of change in the

iditionally, the integration and data may lead telecations and data processions.



tments to merge.

Overall, it's in a state of flux. It's

tving toward something. What's

ng to happen in the end, I don't

w. But if you viewed the teleparate

overaged to the computing and

Research indicates that networks will grow more numerous and complex in the future and that they will fled network managers. "Its just part of the trend to intelligent robots everywhere. We do need telecom management systems and we are buying them in order to control staff size." Hyme says.

As networks become more complex, some set them as supervaides in

nect. "we've come rug circle from computers to communications," Gil-lerman asserts. "In the plast, comput-ers fed networks. Now, the network is central and the computers are nodes on it."

'Voice/data integration was a ally hot go-word for a while. People ant to learn ab

it, but it's only pplied on a spotty basis. There are many ways to still use voice and data

separately without combining them.'



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L be imple

Most expert systems will be implemented on existing conventional hardware and most conventional software

3 c tightly

Most expert systems will be tightly integrated wit missing DBMS, accounting systems and other implications software.

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Most expert systems will leverage existing software applications and will more effectively solve problem already being solved today.

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### Where have all the hackers, hobbyists and home users gone?

#### By PEGGY WATT

A libough few realized it in the companies of the limited companies of

whereas 17.1 million went to k in the office this year. It has

been more than seven years — even pre-IBM Personal Computer — since hobbyist buyers were anywhere near he volume of corporate purchases, aid Norm DeWitt, Dataquest's direc-

said Norm DeWitt, Dataquest's direc-tor of PC industry service.

"The home market probably began to lose its significance around 1978,"
Be notes that hobbyists reached their buying height in 1983 (one year-before Tisse magazine's "Year of the Computer"), when home and hobby-ist purchases numbered 1.4 million, a figure still dwarfed by the 10.7 mil-lion micros in business.

n micros in business. Since then, the hobbyist buyers' pulation has dwindled while the population has dwindled while the corporate purchases continue to climb — not at the 50% yearly growth of the early 1890, but enough to keep plenty of disks spinning. That what readly helped move ning. That what readly helped move floopy disk at a reasonable price and erross business applications — Lotus Development Corp.'s Visicale and Wordstar. Before that, you had games or whatever you programmed yourself.' DeVitt says.

But the hacker—in the tradi-tional meaning of skilled hob-byte, not criminal—in sold dead. Re-tinal—in the skilled hob-led to the skilled hob-"In almost every corporation, there's noe or more persons who came up from the hacker ranks, who's there as a representative of the informa-tion center," says Steve Mann, who was the blad that beneaving position when the skilled the the skilled has recently left to become a finan-cial computing services consultan-cial computing services consultanal computing services consultant think even in the corporate envi nment, they need hackers," h

adds. The office hackers, obviously, are not the traditional hobbyists. They were probably not among those who nent away for 1-10 Beath kits and assembled their own early personal computers. But they are the ones who spend a little extra time stretching and playing with their systems, perhaps driving the MIS manager to distraction — or sometimes being retraction — or sometin ited by the departmer "By and large the majo is users came up from a

enough to get their work done with Lotus or Symphony," consultant Mann says. "They didn't really want to pay attention to what's new in the ology. They want the miniming curve to get the maximu

In fact, the hacker ment night help business users get i from PCs. Training consultant I ess users get m rom r.a. Training consultant Rich-rd Gillingham, president of Matrix ervices, said users who take a just-he-basics attitude are hurting them-less. Tim a bit of a gloom-and-som person on this right now, occause when you look in a corpora-on, you find people are not ready to ove up, and they even have holes in

some of the basics," he told MIS man-nagers at a roote conference.

"Eighty percent of the people use for 50% of these ordsware's capabilities from the start set he hadron's meta-ham added. "Raybe 10% of the po-ple use about 50% of their not wars."

"The start of the hadron's meta-phoposis was inertiable." There are a few little companies that still build capabilities. It's not a criticism of us-ers, but it's the reality of the situs-

M icrocomputer pioneer Adam Onborne went from hard ware production with Osborne Com-puter Co. in the early 1980s to soft

morphonis was incritable. "There are a few little companies that still build kits and specialty boards," he says. "But the hobbyiess are sort of the ham operators of the business now." The hobbyies still plays a role in the industry, Dataquest's DeWitt says, "Biobyiess are often the first to jump on new machines. The Atari to jump on new machines. The Atari first buyers were hobbyias. And had buyers were hobbyias. And had buyer often the first buyers were hobbyias. And had buyer often the first software deve-

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## After the VDM, Felsenstein is 'having fun' with other projects

By DAVID SRIGHT

Built in 1975, Lee Fel-senstein's Visual Dis-Josey Module (YDM) was the first piece of personal com-puter hardware providing or a memory-mapped alpha-numeric video display. Which the VDM board, which Fel-

anowed data to be displays on a screen, personal compe ers could be used in an inte-active, real-time fashlon. The VDM was first built work with the Micro Instr-mentation Telemetry Sy-tems' Altair, and versions to the VDM design soon shows up in several personal cos-



er systems, including the io Shack Corp. TES-80 el 1 and the Apple Com-er, Inc. Apple II. elsenstein is currently in process of changing Gole-t, Inc., the company he inally founded in 1979.

them," he says. "That is what I really want to do. We are making that move at this moment"

ng his latest pro-tein hints that it e supporting the IBM Per-al Computer, the Apple cintosh, the Atari Corp. and the Commodore, Ltd. iga. He claims that the duct, which may arrive early 1987, will set a new

rly 1000. fard. ro years after founding mics, he helped start Os-e Computer Corp. and

MICRO PIONEERS

for the love of it, and I the for the love of it, and I think that shows in terms of what happened and how," he says. "The kind of dedicated to bringing back as much of the fun as I can. I want to Assw the fun. Everybody else can

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ple. Its revolving tray of flour microcassettes lets several people dictate from in the office. Or out of the office Because with the Messenger you can phone in your dictation. You can assign the microcassettes according to department, type of task or priority.

any to represent the second se

nents away.

And VoiceWriter lets you add to recordings exactly where you want the additional text. When you dictate your addition, the system inserts it right where you want it by "moving over" all the text that follows. You don't have to worry about erasing the original recording.

The VoiceWriter System has a

ing the original recording.

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# Hungry giant looms over software marketplace

By CHARLES BABCOCK

n looking for a relational data base management system, Amex Life Assurance, a division of American Express Co., recently evaluated IBM's DB2 vs. an independent software company's

Amex Life found that both DB2 and Supra, a product of Cincom Systems, Inc., "gave us the relational capabilities we were looking for." but Supra had an edge, recalls Jay Kelley, the systems manager responsible for the evaluation.

Because Amex Life does not want to start processing claims for which it does not have policies, it needed referential integrity in its data base. Supra had it; DB2 did not.

Amex Life also liked Supra's three-schema architecture, which separates external data views from internal data structures, Kelley says.

Finally, Amex Life saw the fourth-generation language, Mantis, that works with Supra, as "a real workhorse," Kelley says, while IBM's Cross System Product is just getting established in the market.

'IBM purposely refeat to you deal to you do you we not you wendor vs. IBM. They want you to for you do you wendor vs. IBM to report you do you will not you wi



on increasing its software revenue, with data bose management with data bose management of the control of the control of the treat where it is likely to launch new initiative. Whether the independent software companies continue to thrive in this climate or find themselves reduced to the status of the BUNCH companies in hardware is a question of overriding importance — not only to themselves but their customers.

The contest actually began prodeed by critics and antitrust suits from Applied Data Rearch, inc. and other young companies, unbundled software from its hardware and a group of technically proficient, hard-hitting software companies grew up to take advantage of

Today there are more than a dozen companies in the \$80 million to \$120 million revenue range and a smaller group, such as Management Science America, Inc. (MSA) in Atlanta or Computer Associates International, Inc. in Garden City, N.Y. in the \$180 million to \$220

million range.

The independents' revenues, which added up to \$2.4 billion in the world marketplace in 1985, were still overshadowed by IBM's software revenue of \$4.1 billion. That represented

only 0.2% of 10% revenue, or wall Street analysts believe it represents a significantly higher share of 18M\* a profits. In addition, software revenue, esgrowing at a rate of 29% annually, while hardware revenue, especially mainframe processors, is believed to be growing in the 6% to 7% range.

#### **Expanding software business**

These facts have surely given strategic planners at IBM's corporate headquarters in Armonk, N.Y., cause to consider expanding the opportunities in software. One way is simply to charge more for its huge installed base of systems software, which IBM has been doing the control of the control

ware opportunities through the availability of software.
Earlier this year IBM signed an agreement with Hogan Systems, Inc. to market its banking software line. Burroughs Corp. and Digital Equipment Corp. have succeeded in selling hardware to banks, and with financial services an expanding sector of the economy, IBM addressed this market from the

software side in the Hogan deal. Scott M. Smith, a former analyst with the Gartner Group, Inc. and now vice-president of Donaldson, Lufkin & Jenrette, Inc., the New York brokerage house, in a talk earlier this year **Executive Report** 

Picture John Opel sitting in Armonk, watching his largest customers delay hardware purchases because a banking application is faulty.... In many banks, account control rests with Hogan Systems, not IBM.

- Scott M. Smith Donaldson, Luftdn & Jenrette, Inc.

to American Management Systems, Inc., said several banks put off buy-ing 3000 mainframes prior to the BBH-Hogan deal because the installa-tion of Hogan software was behind

"Picture John Opel sitting in Ar-monk, watching his largest custom-

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ers delay hardware purchases be-cause a banking application is faulty. ... In many banks, account control rests with Hogan Systems, not IBM,"

rents with Bogan Systems, not some, Smith says.

In striking a deal with Hogan, IBM moved into the banking application smarketplace in a fashion that left some independent applications ven-dors wary of how forcefully IBM could move into a new areas.

For one thing, Hogan eliminated its domestic sales force, turnible entire marketing function over to row.

emitre marketing function over to illustrate and the production of the production of

Smith said.

To serve this purpose, IBM established a 120-person IBM information Services business unit three years ago to sell services from its information network, to sell consulting services and to design or acquire application packages, industry sources.

The Hogan deal was one of its first source, aspection tailsy. Assirtation was a single tailsy. Assirtation was a single tails and tailsy assirtation to the tail of the tails and tails are tails as tails and tails and tails are tails and tails and tails and tails and tails are tails and tails and tails and tails are tails and tails and tails are tails and tails and tails and tails are tails and tails and tails are tails and tails are tails and tails are tails and tails and tails are tails are tails and tails are tails are

orking relationships and joint-eting agreements with IBM are thing many independents wel-But they are likely to come on

come. But they are likely to come of the applications side.

Many independents also realiz-large revenues from systems soft ware, producing utilities or specis function add-ons to the IBM operat

after what has become a standard product in the mar-fect and makes it part of its basic systems offering. Many believe that is what it is doing now in the field of data base management. "Every 15 or 20 years, ISM pushes the independent software vendors one layer turther away from the com-puter and toward from the concept of the cus-tomer." Come hard is con-puter and toward the cus-tomer, "Come hard" is created.

By establishing DB2 as the primary data base management system. IBM will be able to surround it with tools and applications and graft a new source of resystems base. Of its \$4.1 billion in software revenue in 1986, 89% actimated to stem from the atting systems, despite IBM5, despite IBM5 offering of 3,000 applications.

Imlay is wary of IBM's pe-nnial push deeper into sys-

were.

Nevertheless, the data

"I don't feel any ever
whelming enthusiasm for

DBS out there," says John

Cullinane, chalmans of Co
linet Software, inc. if IBM

was selling mainframen at a

faster rata, DBS would be

more of a factor because it

would be going in on them, be

add to the common of the common

They do not have that They do not have that the place to themselven," some 5 Tablossly ears. He yr Clacom shipped 175 per of its new relational oduct, Supra, since March d that it is competing ef-citively with DB2, he says. "A lot of our Adabas users "A lot of our Adabas users we shelf," claims John Ma-ire, chairman of Software of North America, Inc., the sells the Adabas data se management system.

sich sells the Adabas data e management system. Many of the statistics that we a large market share DB2 are really showing triap where it is being ex-imented with alongside

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'Every 15 or 20 years, IBM pushes the independent software vendors one layer further away from the computer and toward the customer.'



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# IBM evinces interest in applications software

Management Science looks into lion's jaws

Ithough IBM is showing a growing interest in applicans software, Management Science series, Inc. (MSA) Chairman John ay says he does not think it repress a significant threat to his com-

teits that IBM might conceivably in-vised they cane on with a new man-officeturing gyaten, they would still have a problem with the user. Forty percent of mainframe users develop packages, "hanky any; fie adolt has the packages," hanky any; fie adolt has the thinks a strong posh by IBM into the thinks a strong posh by IBM into the man that the thinks a strong posh by IBM into the man that the independents would benefit as much has IBM. Comslame, Inc. I breatdent Bich-Comslame, Inc. I breatdent Bich-I breatdent Bich-

A successful applications vendor is really supporting a string of prod-ucts, each representing a \$10 or \$15

ucts, each representing a \$10 or \$15 million business.

"To IBM, \$100 million to \$900 million looks like a niche market. If they move into applications, how much revenue will they get? How do you manage \$50 415 million businesses? I don't see how they can do it," Cran-

dall any.

Nevertheless, Inilay and other observers say both manufacturing and insurance are likely follow-ups to IBM's peak late beathing through the initial control of the property of the late of the IBM now in seiling its manufacturing, packages against the aging IBM Manufacturing, Accounting and Production Information Control System and tion Information Control Systems and tion Information and Control Systems and Co offerings. By continuing to enhance its products, MSA will be able to compromets, MSA will be able to com-te with them in the future, he says. "In our line of financial applica-es, human resources."

ons, human resources and manufac-ring, IBM is one of the least of our impetitors," he says. In accounting optications, certified public accoun-tins with specific business expertis-ake up one-third of MSA's developnt teams. IBM can do the se thing in selected areas, Imlay says, "but they can't be everywhere."
For that reason, Imlay says he thinks IBM will seek alliances with

more independent software compa-nies in specific application areas, and MSA itself has agreed to jointly mar-ket higher education software from its new acquisition, Information As-

'Friendly but indepen "We want to be friendly to IBM at remain independent," Imlay

adds. On the systems software front, few challenge IBM's dominance. Gen-erating a product comparable to IBM's flagship production operating system, MVS/XA, with six million

lines of code, is a task beyond the reach of most independents, who compete on the basis of products with 100,000 to 500,000 lines of

code.
"IBM is probably the only soft-wave company in the world that can effectively manage a project not be scale of a major operating system. The typical knock that IBM cannot develop 'good' software is treme-dously malesdaing," says Sooti M. doath, a former analyse with the present of the control of the

IBM on this front as well and fare more unevenly than in applications. Applied Data Research, inc. (ADR.), for example, came out with its tel-processing monitor, Roscoe, in 1970, and IBM followed mix with TSO in 1972, recalls Martin Goetz, now se-nior vice-president and chief techni-

cal officer at ADR.

Roscoe is still installed at nearly
2,000 sites, and ADR claims a 10% to
15% market share, to IBM's 75%.

"We're the prime alternative to
150," a satisfactory outcome for
most independents, foots says.

Another ADR teleprocessing monitor, Voille, did not fare so well. To competen with IBM's Interactive

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### Executive Report 1.000th Issue

# 77

'If IBM came out with a new manufacturing ystem, it would still

have a problem with users. Forty percent of mainframe users develop their own software. They don't buy packages.'

Continued from page 212
Computing Control Facility (ICCF)
and started losing market share in
1881, after IBM introduced the 4300
processor series that included the ICCF that carried a price tag of \$60 a

"We thought that was predatory and complained to ADAPSO," the as sociation of software and ser ies, Goetz says.

IBM then included ICCF with each delivery of its DOS operating system. delivery of its DOS operating system.
"It almost became a requirement to get ICCF.... You had to sign an agreement you would erase it from the tape if you didn't plan to use it," Goetz said, and Vollie's market share nd to 5%.

With some utilities, IBM easily

ood from page 211 fourth-generation dominates the market once it decides the product is a key offering that will go out the door with each operating

Still room to compete

to processor sales.

They do not have the appetite to engage in a three- to six-month competitive evaluation for a utility prod-

" Smith said. The independents, he added, "have carved out high-growth oppor tunities for themselves, providing utilities that support the core IBM

ducts so they will be able to work with DR2

So far DB2 works only with IBM's largest, most expensive operating system, MVS/XA, leaving a large market of DOS/VSE and VM system think the independents have room to ers for the independents to ad-"IBM salesmen know how to sell ardware and operating systems tied

en if IBM comes to dominate data base management systems, many observers think there are still opportunities for independent supply the software its cu

"I think IRM counts on the ir dent vendors to fill some of the pendent vendors to fill some of the gaps. IBM purposely presents a square wheel. They want you to round off the edges. It saves them de-velopment costs," says Carole Mor-ton, president of the Dylakor Divi-sion of Sterling Software, Inc. DB2, with its lack of a fourth-gen-

# "

IBM moved into and moves into banking applications in a way that left some vendors wary of how forcefully IBM could move into a new arena.

ation language, data dictionary and weerful user-oriented query lan-sages is an example, Morton says. Comshare's Crassdall says the in-ependents can also find opportunity

n providing professional services alone with software. About 90% of our software sales

last year were accompanied by some sort of professional services — in-stallation, implementation and inte-gration. . . . My prediction is that is where the market is headed," he

R egardless of where specific op-portunities lie, many observ-ers think independent software com-panies have matured as businesses, a point that will belp them in the com-ing competition with IBM.

ing competition with ISM.
"Over time, corporations have been conditioned to buy from the in-dependents," which is one reason why IBM doesn't do very well in ap-plications, Gortz says.
Smith stated: "For those indepen-

some states: For those independent software vendors who choose or just unfortunately happen to compete with IBM strategic products, the implications are clearly negative...

The DBMS market is the obvious ex-

ample."
But, he added, independents who deliver products that complement or support IBM's "should see accelerated growth as they ride on IBM's conttails." By improving the ease of use of its operating systems, IBM is

nadening the market for applica-ns, which helps independents, he

"I'm glad they invented the squ wheel. It allows my company to b business and make money," D kor's Morton adds.



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# Arificial intelligence put to productive commercial use

# By EDDY GOLDBERG

A rtificial intelligence inn't what it used to be, and that's good news for corporate users. After years of exaggerated vendor claims and user hopes, AI is beginning to find nordustive use in commercial appli-

Much of the early work in Al was re science, performed on dedicated uming languages.

day's popular programming lanla addition, the ability of expert single. In addition, the ability of expert single bases offers a business a way of scappulating and retrieving the smetimes hidden axioms of its day-

Special actions hidden axiomatics hidden axiomatics hidden axiomatics of the conduction of the conduct

They could also be used to con-struct data bases and the applica-tions that work with them without requiring professional MIS program-

"I don't think I've seen an expert stem yet that cannot be written in conventional language," says Har-

ry Reinstein, president of Alon Corp., though he scknowledges there are cases in which it can make economic sense to use a specialized language. Alon, based in Palo Alto, Calif., is a 24-year-old developer of expert sys-tem application development tools for companying ID environment.

r commercial DP environments.
"It's important to make this tech-logy svaliable in the operational vironments that exist today," instein says. He sees a growing ie for expert systems embedded in einstein says. In sees a gaverne, se for expert systems embedded in aditional applications, such as a eneral ledger or accounts payable ackage, supplied by today's large oftware vendors. In the next 12 to 24 months, m expert systems will be packaged so corporations can use them off the

'The real value of Al is that application are easier to build and maintain. Rather than rewrite the system, change a rule, and the system

restructures itself." - Esthe

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shelf, he says.
According to Bruce Johnson, partner-in-charge, Artificial Intelligence
Practices at Arthur Andersen & Co.
In Chicago, 20% of Al technology will
help with 70% of commercial problems, primarily through use of rulebased systems.

nesed systems.

He says he feels, however, the power of Al technology lies not just in rules, but in a number of programming paradigms working together; object-oriented, procedural, rule

object-orientes, processures, absect and others. He still prefers PL/1 and Cobol for producing a highly efficient transaction processing system, since many applications already exist. But to understand complex new problems, powerful took, many of which are written in LISP, speed the design pro-

"Al technology is after new prob-lems, trying to take on a whole range of problems that haven't been tack-led before," Johnson sav-

Many products are coming to the C language. Though hardware prices are beginning to show demand-term to the control of the con

# Connecting artificial intelligence to MIS

o natter which method is employed to develop an Al-based application, once it is completed a problem remains. "You still the to attach it," says flather Dyson, publisher of the "Release I.O. new selector. "Eal' the problem is communications protocols and data bees access you need communication lishs," also says.

"We're getting more and more into tying into other data bees," says Frank Bordsion, manager of AI at Westinghouse Electric Corp.'s Power Systems Business group in Pittaburgh. "We need Prolog with hooks into other languages, like C, to says. He says he still encounters medium at problems in writing books from the Prolog grams to the data in MIS but that the job is

perting cleaner with emperature.

Berguet Ethern, who heads up Half's AI proBerguet Ethern, who heads up Half's AI proper and providing heads to have AI who had beperformed to the performed to the performance of a company if information and makes its more
nonemable to executive landing comparing white performance of the performa

lion a year, an expert system used for process optimization in one of the company's manufacturing plants. Berdelen says that although different human experts exist for each section of the manufacturing process, no one expert had a

Using an inductive learning methodology, risks consists of linearing examples into a prorum that automatically generates, the aras of expective were interoperated into one exret system, optimizing all the stages of annufacturing. "We developed instights that cering perameters were important to the processnat we didn't realize before," Bordeloin says. He as found the inductive learning programs to be as found the inductive learning programs to be

amast experts and the

AE (Application Expert), a recently announced [CW, Sept. 1] shell for embedding expert systems in Cobol ap-

plications.

John B. Landry, chairman of Distribution Management Systems, Inc., the Lexington, Mass.-based vendor of Impact/AE, says the product is designed to be embedded in a mainframe application, allowing the knowledge of a human expert to be drawn upon when needed.

The shell's inference engine can be called by a Cobol application to act on the rules in a knowledge base created by the user. It will sell for

,

'As the prices for machines continue to drop, the tools are staying expensive. Knowledge is expensive.'

- Petrick Herrison Computer Science Department

\$55,000 to \$125,000.

Some other companies offering Al products aimed at mainstream computing include Artificial Intelligence Corp., the Carnegie Group, Frans, Inc., Gold Hill Computers, Inc., IBM, Inference and Teknowledge, Inc.

Westinghouse Electric Corp.'s Power Systems Business Group in Pittsburgh has worked on approximately two dozen AI projects since 1983, about one-third of them involving expert systems, according to

intelligence.

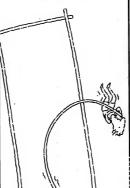
Sixty percent of the applications are written directly in Prolog on an IBM Personal Computer AT, with 20% of them written in LISP and the remaining 20% being divided among Portran, C and other programming

Al work done on PCs

he says they are not being used. Mos of the Al work is done on persona computers using relatively inexpen sive software. He warns users considering em

pend s lot of money and not gain of ot." In a recent study of 125 exper

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a maintrame.

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be your natural choice.

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220-volt outlet.

14

It's like a Concord

And like a minicomputer, the Midframe is easy to use. We've created a software package called SHIELD that lets just about anybody in your office use it, without extensive training.

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powerful enough to serve as a host computer for most midsized companies.

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## Executive Report 1 00



'It's important to nake this technolog available in the evironments that exist today.'

nod from page 218 us, 51% were built directly, us-

aymens, a.1.2 were built directly, us-ing a general-purpose programming language, 38% used an expert system shell for development, 6% employed a consultant and 5% purchased off-the-shelf packages.

Researces for in-boson development. Peter M. O'Farrell, who suthored the study for Cutter Information Copy, of Artispon, Mana., solid that systems swould have preferred to develop their systems in-bouse but lacked the technical resources. Industrial control of the study of th

build directly, 19% said they would use a shell alone and 5% of the re-spondents said they planned to use

sponnents and rary planned to use other methods.

Artificial intelligence also offers MIS other benefits. "The real value of AI is that applications are easier to build and maintain," says Esther Dy-son, publisher of the "Release 1.0" newsletter.

newsletter. "Rather than rewrite the system "Rather than rewrite the system, change a rule, and the system restructures itself," she says.

Bordelon says the rapid protyping possible with Prolog and LISP allows the development of programs that simulate all the capabilities of a

"Instead of a lot of work on paper, we can simulate a program within a few days, how it works and what the acreens look like."

"Look! That's ALL-IN-1 on my PC screen... and a comple of to ope are leaked at DATATRIEVE graphs...te Fred's going to show me how to put my LOTUS files into a VAX



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# **Teaching** AI's benefits

# How companies implement aritifical intelligence projects

Bruce Johnson, partner-in-charge, Artificial In-telligence Practices at Arthur Andersen & Co. in Chicago, says his group has consulted on many Al technology proj-ects and they fall into six ma-

groups:
1. Self-contained

tems.
3. Configurator
for part and com
sign, modular pre
and the process an

Diagnostic systems for tracking and repairing hard-ware, software and biologi-

ng systems.

6. Unstructured infor Unstructured informa-in processing in which the stem designer has no con-ol over how the informa-on arrives. Software engi-nering systems was on the

it as a separate category.

Al sppears to open the or to the use of judgment its and weighted reasoning business applications rather than the straight number. 

He says AI is in transition and is still a technology look-ing for a solution in many companies, where it is being ing for a solution in many in a comparison of the comparison of th

the corporation's approxi-mately 70 business units. To-tal project costs are in the \$25,000 to \$50,000 range per expert system with reports of an 85% to 90% success

Expert system tools will have to run on both PCs and ainframes to be succes ad prices will fall dran ly as competition her he says. He sees the ma today in a transition fro

rate, he says.

by corporate MIS.

"MIS/DP shops will soon
have a wealth of AI resources to draw on," says
Tom Schwartz, president of
TSA, a Mountain View,
Calif.-based consulting firm.
"The motivation is cure are.

continuous speech, connect-ed to an expert system shell, will allow end users unfamil-

ture reports with-

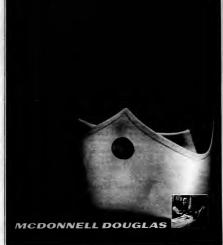
Over the years, as me ed into existing you will

the end users to build their own applications," he says. "At the same time, the focus of MIS/DP will be moving away from application devel-

larger expert system devel

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# Industry drives ahead on Blue cycles

T

### By CLINTON WILDER

he rapid advances in microprocessor technology in the last 10 years have changed the shape of the computer industry in ways none of its original players could have foreseen.

While the business of seiling computers has been through numerous economic cycles, consolidations and shakeouts during the past three decades, the industry in 1986 faces more market-driven challenges than

main security of the control of the

shore up its once-ununutatione market position.

The headlines of 1986, predicting a second straight IBM yearly earnings drop for the first time since the the Depression, would seem to be unthinkable in the computer age.

# IBM will meet the challenge

But IBM has overcome challenges before, including entering an industry once dominated, if not monopolized, by Remington Rand, Inc.

It's human nature to say, 'People made mistakes, but we'll succeed.' Ender Bulleve I manched "Time I manchine arrived in 1960, both sooner and technologically better the state of the state of



for two Univacs at the U.S. Bureau of the Census, in 1961. But somel like countless other vendors By that would beat IBM to the ine Dr

punch in new markets during the next 35 years, Remington Rand became the first computer industry victim of IBM's avesome market power. "From the minute the Census Bureau put in the first Univac, our drive was totally commercial," former IBM President

our drive was totally commercial," former IBM President were built by IBM.
Thomas J. Watson Jr. said in a "Deys interview with Computer world." I always managed through being terribly afraid of failure. . I was absolutely panicked." I was absolutely processed for the process of the proces

investment that paid off hand

By 1956, according to Katharine Davis Fishman's 1981 industry history, The Computer Establishment, 1BM held a U.S. computer market share of 85% to Sperry Rand, Inc.'s 10%. While the terms "Univac" and "computer" were synonymous to many laymen, some of those same laymen believed Univacs

"They simply out-hustled Unive in a marketing sense," says: Bob Djurdjevic, an industry analyst who left Big Blue in 1978 to found Annex Research, a Phoenix-based firm that tracks IBM and the plug-compatible vendors. "Marketing technology won the day."

### ----

Technology has come a long way from the Univac and the IBM System 360 to the Sierra and the Digital Equipment Corp. Microvax of today, but the importance of a vendor's installed base is still the critical factor.

# "I need to reach both the MIS/DP and data comm manager. With Computerworld, I do."



haron Paster is Advertising damague for Coders Causa on, a wholly owned subsidany of Motorola. Inc. As a supless of beingsteed network policies of being the corpocitions. Coders markets or product may be products. Inbuding moderne, multipleases, communications processors, selvent manufactures, and local area networks.

To increase company awareness and establish preference for Codex products, Sharon to chosen Gomputerworld as a primary advertising vehicle. The reason? Circulation and

Sharon recognizes the important roles played by the MS/DF manager and the delat communications manager in largevolume purchasing of Codex products. "Our primary can large in the contraction of the timer is the delat communications manager. But four person often reports to influence in manager, whose influence in the purchasing of delat com-



munications has been increasing over the last lew years."

she explain.

"Many times both the MS/DP manager and the dots communications manager are involved in the purchasting process, Sometimes, depending on the company that, it is either can or the other, index Sucron. To I meed to reach both the handle process, and with Computerworld, I do."

I have not recommended to the computer and with Computer-varied, I do."

It for mentantin, Sugre-law.

As ior reodenthip, Sharon has conducted dutiles over Coden's customer base and bused Computerwords to be estimated by well accepted. "Of our customers who are responsible for both data processing and data communications. Computierword is the best-reod publication," claims Saron. "And, for possible for only data communications. Computierpossible for only data communications. Computerthe left publication has possible for any data com-



Purther proof of Compulerworld's credibility is the high regionar has to the Codes to regionar has to the Codes to aponess have to the Codes to aponess have out all my research." ways bearon. "Compuler-world lope both its MSS/DP competition and the data comnumications publications as far and the codes of the comtained to the code of the codes." Computer Codes to the codes of the region of the codes of the region of the code of the large-volume buyers. And thart searchly what Codes is

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# for industry success. In a sense, the industry has come full circle, notes veteran industry analyst William Easterbrook of Kidder, Peabody & Co. In the early days

It is alternated for fully understand the new technology, marketing anyway and getting close to the customer sales. In 1996, the industry players are sales. In 1996, the industry players feworthe beareword is that they sell. If the shape of footby, maintrance computer industry can be traced book to a stagle pote in time, many control of the control

suern across the nation.
Although various technological
glitches in the 360 line would delay
its immediate impact, IBN's landmark announcement represented the
first entire product line offering system-to-system compatibility and mitem-to-system compatibility and mibudiest move to stiff and perhaps
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proprietary architectures and, in this case, over an over monopolitic case, over an over monopolitic case, and a series of the case over a case of the case of the

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Some believe the industry's history is a tale of endors building walls around their user bases with bundled software, proprietary architectures and covert and overt monopolistic practices.

ners Groupe Bull and NEC Corp.
While the U.S. corporate lawdscape of the 1980s is dotted inthe corp. of America and Weperham
Corp. of America and Weperham
Co. classoring to make laroads in the
legacy of the 1960s and 1970s is full
information services business, the
legacy of the 1960s and 1970s is full
of corporate giants that failed dismally in selling computer hardware.
General Electric Co., ECA Corp. a.
General Electric Co., ECA Corp. a.

xon Corp., Raytheon Co., Westing-house Electric Corp., Bendix Corp. and Philoo Corp. were all examples of highly successful corporations that

highly successful corporations that stumbled in a turbulent industry. "The industry's failures are as in-teresting as its successes," says Com-puter Exhabitahment's Fishman. "There is a general optimism and ex-citement about technology that is very engaging, but often there's a

tendency to get carried away with what technology can do and how it can sell. It seems to be human nature in this business to say, "People made mistakes in the past, but we'll do it differently and succeed." ferently and succeed.

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it's antitrust case iten up like ATAT et has

A re driven the larly entr IBM is po

cing a bility, with Big Blue facing a second straight yearly drop in profits for the first time since the 1930s. In the past two years, IBM has been bar-raged by the overall slow-down in mainframe sales,

ion from a

"Right befo sale recalls. "Other vendors thought that IBM might have been over the hill, but the

quickly."
In trying to gauge the in-dustry's future by looking at its past, only the most icono-clastic observers believe IBM last nounced an agreement th Intel Corp. that hinted potential proprietary mi-oprocessor design, and a ries of mid-range "VAX at po

When you recog-nize that IBM is becoming reve-

killer" products.

"When you recognize that
IBM, after seven years of unprecedented growth, expansion and capital investment,
is becoming revenue-starved,
that's like loosing a hungry snimal upon the says Francis Sal-

deput, and a practice Saldutti, vice-president and di-rector of research at Oartner Securities, he. and a former material to the Committee of the Committee of

sarily economics and ket dynamics, not tech-gy. While the latest deents in very large opinents in very large de integration, parallel ocessing or artificial intel-ence might be exciting, it the hard numbers of in-illed base statistics and fit margins that fuel the astry's direction.

We have reached a criti-maturation poise in the

we have reached a criti-cial maturation point in the industry," says Saldutti. "We went through a period when companies began to rely on technology to solve every ill in management. That phase peaked in 1983 and 1984 and won't be seen

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# Mavericks and veterans: Evolving, thriving with the industry

# By ALAN ALPER

We the last three decades, two types of individuals to law become about youngs most with the evolution of measured versus. Most Blatch, the evolution of Risest Crisp, and Fast Ery, chairmen and CED of Converges. Banks has played both made over the substitute of the evolution of Risest Crisp, and Fast Ery, chairmen and CED of Converges as president of Mol Bank Pour, the, and as housine of Risest has played both made over an appealment of Mol Bank Pour, the and as housine of reason and the evolution of the evolut

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### Smith nurtures his brainchild Ely at Convergent helm

It's not easy inheriting a high-flying com-pany that has returned to earth. But Paul C. Ely Ir., who succeeded Convergent Tech-nologies, inc. founder Allen Michels in Janu-ary, 1985 as chief executive officer, has ad-

paint well to the elevation.

By 18, house Convergent the T2 years
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By 18, house Convergent the T2 years
company's company convergent to the Convergent of the Convergent was on the bright of bandrougher. When I acrossed, these of the Convergent of the Convergent was on the Infrastructure of the Convergent of the Conv

'I'm attracted to life

in the fast lane.

Convergent is filled with people who are impatient about

impatient about getting things done

cash-poor company into a position where,

it now has almost \$75 on in cash. after a erry of aco But Convergent is not out the woods The compa-Achilles

emand from firms such as AT&T of Burrough Corp. remained rong. Yet once demand dimin-hed, Ely had to come up with a ew approach. Under his con-and, the firm has repaired reis-onships with its OEM customers

tionships with its ORM customers and has broken out a new operat-ing unit, Convergent Business Ser-vices, which markets Conver-gent's products directly to specific vertical markets. rtical markets. Ety knows from his years of ex-rience at Hewiett-Packard that

perions at Hewistz-Packard that instilling a stronger marketing and sales seene at a technology-driven company is not an easy task. He joined HP in 1962 after a nine-year start with Sperry Rand Gorp, it will be seen the size of HP's first computer project. Ey is considered the force behind HP's happity successful 3000 family of minicomputers, which enabled the scientific instruments make to establish increads in the data proteoming industry. His ascended the HP in 1971, His secretion in HP parallel del the Trus's

eteoric rise in the computer industry. Yet it wasn't easy, Ely says. "HP had to

learn how to sell in what was a dramatically different market — the MIS world. It had to compete with the best marketing company in the world — IBM." Now, he is in the midst of a very diffe

Now, he is in the midst of a very different image-changing process at a much younger company. "I'm attracted to life in the fast isane," he decises. "Convergent in filled with people who are impatient about getting things done quickly. At some places that wouldn't work, but it is a positive thing here." Many contend that Ely is one of the few Silicon Valley executives who could have

In 1982 the IBM Personal Computer estab-lished itself as the de facto microcomput-er standard. It was also the year a new com-pany named Filenet Corp. began its quest to develop technology to make "the paperiess

Filenet is the brainchild of Ted Smith, 57, an 18-year industry veteran. In 1975, the Washington, D.C., native was wood to Southern California to take the helm of MSI Basic Four, Inc., the then minicomputer subsidiary of the now defunct Management Assistance, Inc. (MAD, Under his guidance, Basic Four grew from a \$40 million to \$2200 million firm in 1981 with over 20,000 castomation in 1981 with over 20,000 castomatics.

ers worldwide.
Smith left Basic Four in July 1961 over a
policy dispute three years before MAI sold
the firm to a group of investors. Smith set out
to set up his own firm where he wouldn't to set up his own firm where he wouldn't have to answer to executives of a parent company 3,000 miles away. In early 1882, while other entrepreneurs formed companies to capitalize on the them-raging microcompanies crase, Smith had loftier goals. His

vision centered on design puter workstations to e the storage and retrieval of docu-ments in the office. Smith venments in the office. Smith ven-tured into uncharted technological territory, developing systems that used high-density optical storage devices and networking software to control the flow of documents throughout an office, department

Accounts

Convergent Torbinology

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investors of the merit of his vision. Amassing a mountain of data, Smith had 'PCs would have been an easier thing to get into, but the raising \$4 mildocument image processing systems business looked like

it someday would be

a larger market.'

Present Code, opposed.

The control of the control

that did ploneering work in distributed pro-cessing systems and intelligent terminals. Smith contributed to building the fledgling company to a profitable \$54 million firm. After his stint at Blasic Four, from 1982 through 1984 Smith quietly built sturdy foundations so Filenet could withstand the

1.26 Highest MFTBF in the Industry (25,000 hours) Choice of system inte faces for networking flexibility Choice of green or amber display

### By MITCH BETTS

re catapulted seven aggressive new ndors, the seven regional holding panies, into the competitive fray se information age.

Although each of the seven regi al holding companies — Nynex Corp., Bell Atiantic Corp., Bell South

They all are desperate to keep businesses and other large users on the local switched telephone network

d eager to penetrate the Fortune 0 business market for integrated mputer and communications sys-

"They're putting a well-educated salesman at the door of every large customer," says Fred Chanowski, president of Telecommunications agement Corp.,

The sales force is offering big busi-ses a varied menu that includes anced Centrex services. branch exchanges (PBX), local pret-switching services, metropoli

as the local loop. However, the region to become comprehensive telecom-munications providers has been his-dered by Federal Communications mission regulations that dictate that customer premise equipmen (CPE), as well as enhanced telecom

perating companies' regulated tele-hone businesses. For example, Bell Atlantic can act

as a prime contractor to package the services of its telephone subsidiaries with the CPE of other vendors, but

All of the holding companies have lobbied vigorously in Washington, D.C., for removal of the FCC rules requiring arm's length separation be-tween the network and CPE subsid-

In the meantime, the holding com



ontinued from page 228
icceeded Michels.
While he is considered to be not as
trasive or as domineering as his abrasive or as domineering as his predecessor, Ely is said to be a hands-on CEO who very often takes a con-

Analysts give Ely high marks. "He's tried as best he could to pit the company into a mode so it could be a forward-going business and has achieved his main goals," says James Magid, an analyst with L. F. Roth-schild, Unterberg Towbin in New

York.
Ely is now turning his attention from short-term problems to long-term challenges. "I don't feel the glo-ry days of the industry are gone," Ely muses. "There'll be substantial growth, but it's not over the horizon. It'll take a couple of years, but it will

happen."

Ely, however, refuses to be pinned down on a projection. "The likelihood of say one of us predicting what will happen in the next three years is not good," Ely laughs. "If you want to know what won't hap—"" to the projections." en, listen to the projecti

# Continued from page 228 fice automation to an untapped mar-

ket.

By early 1984, its product development complete, Filenet unveiled its technology.

Filenet's technological approach consists of using an optical scanner to digitize documents and images,

The system is aimed at fine

stitutions, insurance companies, in strial firms and dovernment acco

it is already installed in 35 "paper-intensive" organizations, including Citicorp, the government offices in New Jersey, Home Savings of Ameri-New Jersey, Home Savings of A

and Smith. In a moment of reflection, Smith concedes that Filenet could be the firmal stop in his corporate career. The company, which has raised \$39 million and retains \$25 million in cash assets, is hoping to go public during the Iirst half of next year, market conditions permitting. Smith says he would like to stay on to enjoy the fruits of his labor.
"This is it. I don't want to start a

siness again. I want to run this npany and expand it to be an im-riant entity in the industry."



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regration.

Nynex Business Information Systems Co., for example, obtained a waiver from FCC rules so it can act as a marketing agent for Nynex telephone company services along with CPE, but it cannot share customer information freely between the subside

### **Meet FCC conditions**

Further, it must meet other conditions imposed by the PCC, according to Pete Goodale, a Nynex spokesman. "Clearly, we'd like to have full integration so that our account executives can go to businesses with the information they need to make the best pitch to the client," Goodale ac-

knowledges.

Independent telephone companie
do not come under the separate sub
sidiary ruling because they were ney

er a part of the Bell system.

Rochester Telephone Corp. In made good use of this freedom by o fering a full line of telecommunic tions offerings under the same sale

service and support umbrella.
"I can sit with them and talk



tracts, upgrades, the lines and TI multiplexers as a single proposal, says Joseph Fornieri, manager of Com-Net Systems for Chase

Bank N.A. in Rochester, N.T.

Some business customers say the
wish the regional holding companie
would devote less of their attentio
to expanding their product lines an
devote more of their attention to the
quality of support that they provid
for criticities telecommunications as

Kevin Shannon, who is the manager of telecommunications for General Electric Corp. operations in Syracuse, N.Y., complains that since direstiture, "whenever there is a problem, particularly with four-wire circuits, we end up having to deal di-

### Good statistics needed

continues who expect their carriers to do the problem solving for hybrid networks — especially for hybrid networks that incorporate several different vendors' services as well as equipment — "had better provide good statistics" about where the problem is located, General Elec-

the problem is located, General Eletric's Shannon adds.

"It's too easy for carriers to fu gerpoint."

On the other hand, many of the n gional holding companies are es

lines as part of their campaign keep large business customers, Chaowaki says.

The companies that are responing to business requests for proposa with bids to supply either Centre.

# 77

'I can sit with them and talk with them about hardware, PBXs, maintenance contracts ungrades

ontracts, upgrades, tie-lines and T1 multiplexers as a single proposal.'

# The telecom services front

The divested Bell operating companies have been highly successful in curtailing the loss of large Centrex Service customers, observers agree.

observiers agree.

By converting their central of fices from analog to digital and of ficetag a variety of enhancements like contral office-based local nota, the Bell operating firms are retaining big users who otherwise would turn to digital private branch ex-

anges, says Mark Winther, con mications analyst for Link R arces Corp. in New York. A growing number of Rell one

A growing number of Bell oper ting companies have filed tariffly offer a local packet-switching ervice, but it is too early to tell it hat will be successful, says Rich of Eucha president of EAE As

consulting firm in Cleveland.
"My guess is that it will be more
successful in the long run," Kuehs
says. "I suspect that local leased
channel rates will go up, which
will force the data users over it
the packets. Ultimately it will be



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ting and should be d as part of the service

"It's evident that ISDN
ill be more readily introused through digital central
fices — that's where all
e ISDN trials are happeng — rather than through
e PBX world," he says. ar done poorly compa ith the regulated servi rm. "In fact, I think the all out of CPE sales in ext three to five years suse it's such a common

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# Researchers focus on promise of eye-gaze technology

### By ALAN ALPER

a the 1977 science-fiction novel
Firefor, the Soviet Union has dereloped a fighter plane that can fly
six times the speed of sound — undenected by radar — and that has an in-

make life easier for the physically handicapped or how to actually de-velop an aircraft that could be oper-ated by gazing at flight instruments, work is being done to adapt this toc-nology to a variety of other applica-

ons, including data processing.
While the keyboard, mouse and systick will continue to be the priary ways to control a computer, any contend the human eye gase will one day become an invaluable adjunct to these methods. Some be-lieve research in eye-gaze technology could shed light on the ultimate con-

se bandwidth," says Gary Kill-vice-president at Sentinent as Technology, a Pittsburgh

macons, there's noth-ore natural than looking at sing like a video acreen to ar-mus or to peah buttons," Kili-kys. 'R's a very natural alter-to a man/machine inva-sism." kany says.

IBM scientists at the Thomas J. steon Research Center in Yorktown

a means of controlling a computer. IBM, which was recently awarded a patent for an eye-tracking mechan, was attempting to develop a p-resolution display that could be

nism, was attempting to develop a high-resolution display that could be controlled by eye movement. "We never finished the project," recalls Jim Levine, a scientist on IBM's research staff, noting that the pre-IBM Personal Computer program ed a Series/1 minic raid have made a o uct extremely expensive to purchase.
"We did build an eye tracker, however, that was accurate enough to con-

er, that was accurate chough to con-trol a computer.
While IBM dropped the project.
While IBM dropped the project consistency of the labor are being enjoyed by researchers at the University of Wirginia in Richmond, Levine says. "They are working on an eye-reaching system for the laboration of the l

abs like the one at the Univer-sity of Virginia and another in Trace Research & Development ster on Communication, Control & mer on Communication, Control & mputer Access for Handleapped lividuals at the University of Wis-sin at Madison's Waisman Center visine to push the technology to its it.

mall defense contractor nestled in he hills of northeast Pennsylvania. the hills of northeast Pennsylvania. There, a 10-year-old privately held firm, Analytics, Inc. in Willow Grove, has spent the last 18 months developing cyre gaze technology, used in concert with existing voice-recogconcert with existing voice-recog-tion systems, to control computers, bots and vehicles. The develop-ent work is being financed primari-by the National Aeronautics and sace Administration under the

Called the ocular attention-se g interface system (OASIS), the de-

ing insertice system (UASIS), the de-vice measures an operator's visual attention and vocal intention.
"We are looking at the fovene— where a person sees— to get atten-tion and are coupling that with speech recognition to get intention," notes Analytics' President Steve Leibhois. "It's the closest thing to

Leibhoiz. "E's the closest thing to automatic or unconscious control." OASIS uses a technique in which light is projected into one eye, a por-tion of which is reflected by the cor-ne to create a virtual image that re-sponds to changes in the relative position of the eyeball. Using a high-spect analog signal processor, OASIS is said to monitor movements of the "Also used is a Texas Instruments, inc. voice-reconstition sweem in

tion system in

which a series of single-word com-mands are stored.

Eye movement and voice data are sent to five algorithmic modules that analyze the eye movements and voice patterns, among other things, and translate them into system com-



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nd apart from your competition. It tes 300-by-300 dots per inch of generates 300-by-300 dots per inch of near-typeate quality text in any number of different typedaces, together with business graphics such as line drawings, pie charts and bur charts. Not only is KISS affordable and inexpensive to operate, it prints faster, quieter and with higher resolution than most daisy wheel or dot-matrix printers.

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### **Executive Report**

position, and an oculometer is fixed on his pupil and comes to follow the cye's movement. The subject's voice commands are stored in the speech

ne subject is then asked to follow novement of objects on the moni and to invoke the command "fire" wand to invoke the command hen the cursor becomes a zed with the target. If the co-synch when the command is the target is destroyed. While NASA is most intere n synch d is given

while NAMA is most interested in the technology for its manned space flights and stations, Analytics con-tends the OASIS's applications are endless. The company has already come up with 26 applications, includ-ing aiding the handicapped, air traf-fic control, robotics and computer

nc control, two-search system management.
Under the computer heading, the firm lists data retrieval, computer-aided-design and manfacturing, photographic interpretation, signal process

gement and computer vision. uite viewed as an adjunct to oth-put and control methods, Leib-oreaces (ASIS being used as an mely fast and accurate way of hing through dense data bases siered data. Some view it as an n Woods approach to comput-

"In our concept, an operator can pick one item out of 100 items that flash by on screen 100 items as fast as if doing it manually," Leibhoiz say: "It's a more sophisticated way of visual recognition."

t is the voice portion of OASIS that may prove to be difficult to apt to commercial settings, he ids, noting the limited number of ords such devices can recognize as all as the ambient noise as factors at cause inaccuracies

that cause lancouracies.
Analytics musts overcome other technological hurdles as well. Natural occurrence, such as blinking and eye diffit, cause OASIS some system to the control of the

and to overcome."
So far, under the NASA Small asiness Innovative Research proam, Analytics has received the feasibility of 

nent acquiring equipment. The firm is currently seeking addi-sonal funding to develop two engi-tering prototypes in 1867 that with firmware and software drive mill firmware and software driven and its multiprocomor technology, believed the firm is looking for vestors from the petvale sector but also considering breaking out the

ASIS project as a separate is a public offering. Meanwhile, Analytics

Meanwhile, Analytics hopes weledge gleaned through develop-nt work on OASIS on how the in analyzes information received in the eye will form the founda-a for study of actual thought-con-lied systems. Leibhots believes 16 a no

There's no reason why you can't

get at what a person is this Leibholz says, "I'm not prep go into detail, but there is p encephiograph to achie n of focus or s

while de rvelopment work at Ana-nues, Sentinent is already lytics con

sytucs continues, Sentinent is already marketing a device that uses eye-gase technology to enable physically impaired people to communicate.

The firm recently began shipping a cost-reduced version of its eye-tracking device — called Byetyper—that is priced at \$3,000 and can be connected to microcomputers nected to microcomputer rough an RS-232 port. The 3-year rough at the property of the company was founded by former arnegie-Mellon University enginering students in Pittsburgh who ere involved in a volunteer project

ilidren with cerebral pal cate with their eyes. So far, Eyetyper is mainly used in d special ed as Kilkany, h ol sys

chnology.
"Right now, the system is us

people who can't speak or move their hands or legs easily," Kilkany says. "It's not sold to mainstream America at least not yet. We do want to go

in that direction.
"I can see it used in computing as a device that enables a user to select mesus," he continues. "Or, in factories where a worker's hands are busy, and he needs to register defective parts and can do so by look





# -

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gering is now user definable and allows taking direct control of the ASCII printer generating com-puter graphics, alternate char acter sets and other device unique outputs

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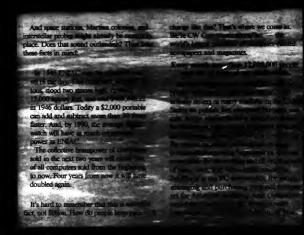
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1 TUZ MENN

If the space program had advanced as fast as the computer industry, this might be the view from your office.







Dean F. Redfern Age: 32 VP/Information Services McCormack & Dodge Annual Budget: \$14.7 million Road Racer

The influence of Informatio

Services is beginning to extend well beyond the traditional boundaries of the com puter room. Today's IS department is developing strategies for networking. Installing telecommunications. And busy adding micros in virtually every

corporate department corporate department.

With a future so promising and dynamic, it's no wonder up-and-comers like Dean Redfern find Information Services so attractive.

mo unormation services so attractive.

Dean has always had the inside track in the world of computers. The son of a DP manager, he began programming in COBOE and Fortran at the age of 12. At 23, McCormack & Dodge, Dun & Bradstreet's software development company, hired him from his formal training at Hartford's Computer Processing Institute before he could even finish.

His philosophy was quite simple, even in his earliest days. Not one to live by others' rules, he vowed to employ any tactic, embrace any product, use any technology, as long as it got the job done. Several years ago, for instance, he was forced to move his entire IS/DP department acros

Societ to move his entire IS/UP department across town. IBM told him the job would require at least a week of downtime. And that was all the challenge Dean needed. He resited rooms for his staff for a weekend at a nearby hotel, and accomplished the task between business hours? Friday to Monday. Every one of his 700 Iterainals was up and productive Monday morning.

tive Monday morning.
In 1984, Dean designed and implemented a nationwide SNA network so all 12 U.S. offices could demonstrate McCormack & Dodge's main frame software on site. That move contributed inicantly to a 50% revenue growth in the folio

ing year. Today, Dean in responsible for a staff of 150, and a budget of nearly \$15 million a year—a good part of which goes to purchase the 300 micros load attending peripherals he installs every.

Dean is also a moif road norr—he rans some 60 miles a week—an active member of the BWY Car Cho A function, and world traveler. As you can image be about part of you not be a first of the same of the same

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# ► Reader Commentary

# Vendor airs and market doldrums

By SHELDON R. GAWISER

very business publication seems to have blasted the computer industry recently. According to their articles, the computer industry is largely responsible for the current economic malaise.

Numerous reasons are cited. The industry needs to design easier to use systems, fit systems better to user needs, bring new technology more quickly to market. Even John Boach, chairman of Tandy Corp., was recently quoted in The Hall Street Journal as blaming part of the doldrums of the industry on lack of innovation.

One of the major arguments used against the industry is the number of idle computer systems, those purchased but never really used.

In most cases this argument concerns micros. (I have not yet seen any evidence of brand-new mainframes sitting idle because the company did not have any use for them.) But what is the root of this problem?

Introducing any new tool into the business environment is a management challenge that starts with the decision to purchase a tool and includes its selection and cost analysis. If the results of the analysis

justify the investment, the company will purchase the most appropriate machine from the most qualified vendor.

Suppose a company goes through such an analysis and decides to purchase an injection molding machine. Later man-

Gawiser is president of Gawiser Associates, Inc., a Westport, Conn., consulting agement finds that the machine sits idle most of the time maybe because of incorrect sales projections, maybe because the machine was simply a poor choice.

In either case, there was a bad management decision. Does the injection molding company and industry get blamed? Never. Why then does the computer

industry get blamed for idle computers? There are three basic reasons: The computer industry is guilty of overselling. The computer is not the solution to every business problem. Instead, it

is useful in some and useless in others.

Too many business people rely on the opinion of unqualified advisors when evaluating

# "

The computer industry is guilty of overselling. The computer is not the solution to every business problem. Instead, it is useful in some and useless

in others.

and purchasing computers.

The salesperson in a computer store has limited product

inowhedge, and his opinion is often based more on what is in stock than on what is in stock than on what is best. Moreover, neither the retail salesperson nor the direct salesperson for a computer manufecturer is likely to spend the time to learn enough about the business in question to make an increase where mainframe companies have the ability to spend considerably more time and effects.

Managers make mistakes. Too often they view the purchase of a personal computer as a trivial expenditure. After all, how much time can

expenditure.

After all, how much time can you spend on a \$3,000 to \$5,000 purchase? However, the price of

# Videotex: Beyond the word

By MICHAEL A. CONNIFT

nc., videotex was the start of consumer marketing dreams, a word maje collect of meaning, a magic carpet for the rainbow of services that would surely and swiftly computerize the American home. Electronic newspapers, home banking, home shoping, bill paying — even egg scrambling snuck into breath of the collectronic newspapers, borne banking, home shoping, bill paying — even egg scrambling snuck into breather of the collectronic newspapers of the collectronic ne

The English had their own word in the 1970s for the technology: "viewdata," for the pioneering Prestel system then stumbling into the consumer

marketplace.

The Canadians had "telidon" technology subsidized by the government. Marketing arms of the Freach government came ashore with bewildering nominal inconsistency, calling their solution everything from "antiope" to "telematics" to "mini-tope" to "telematics" o "mini-

to.

This confusing name game and concomitant international standards' spats, threatened to sink videokes before the word ever reached Webster's Dictionary. Then what passed for sunlight flashed through the clouded North American scene.

At Videokex '81 in Toronto, AT&T, CBS, inc., the Prench and the Canadians agreed on a new

standard, soon to be tagged "North American Presentation Level Protocol Syntax" (NAPLPS), or nap-lips to the industry cognoscenti.

There was a brief and near-unanimous agreement that this

graphics-rich standard, designed to stuff logos, colors and Conniff is a consultant and writer based in Burlimpton, VI. animation down a consumer's telephone line, was videotex. Videotex thus meant pages or screens of information, accessible with a dumb terminal via easy-to-use menus, a data base

that was adorned with pretty, cartonesseus NAPLPS graphics. As news of the new protocols filtered south from Toronto to the U.S., it was assumed the oil-gooplistic power of AT&T and CBS would spell success for videotes in the home. Fortune 500 media companies like Time, inc. and Times-Mirro Co. hastered and Times-Mirro Co. hastered to the conference had wrought. In this fashion, the word videotes: came to mean consumer videoes; graphic services in the conference pade services in the conference pade services in the conference pade services in the conference graphic services in the conference pade services in the conference

Gradually, however, the first signs of semantic confusion as peared. In its own awkward way, the press was hyphenating and adding text to make sense of the contradictory concepts inherent in the words "video" and "text." The technology had little to do with either.

Videotex has little to do with video or television. Consumers turning to videotex as interactive television were in for swift and unsettling disillusionment.

77

By attaching "video" to home information services, the word raised expectations that the net result had something to do with television.

Knight-Ridder Newspapers, Inc., Time and Times-Mirror (and, more recently, Covidea, the joint-venture between AT&T, Bank of Americs, Chemical Bank and Time) compounded the error by trying to market videotex services as an adjunct to

the television set. In fact, videotex has little to do with video or television. It

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decision. The risk of an inte PC-may appear relatively small, but there is also lost time and effort of staff. There can be far worse consequences if bills are not sent out on time, receivables not collected, inventory not reordered, discounts on payables not realized, or pay-roll not run.

roll not run. The cost of automation mistakes can be many times the cost of the system. But this does not differ from the cost of other tools.

What should the user con-

what should the user computer industry do to help reduce these problems? There are five principal steps: First, vendors should tone down the promises. We ought to look carefully at the expectations raised by our ertising and promotion, uding our claims regard-

77

While there may be a place for

ing how easy it is to auto mate a company. Second, vendors should help to educate business p to educate business sple. Let's make sure that

es m

They must understand that (a) computers are impor-tant because they deal direct-ly with the operations of the business; (b) no installation of an automated system will ere must be time to train ad run parallel systems; and siness people need to what tasks they can m profitably with

dise for new te hile everyone kr ogy. While everyone knows a better, faster, cheaper alter-native is just around the cor-ner, no one will survive in this industry if we constant-by sell futures. For most busi-nesses, there is no real ad-vantage in waiting for the

Fourth, vendors should avoid selling by knocking their competitors. While there may be a place for fear, uncertainty and doubt in tell-ing your children not to talk trangers, it

Comparisons can be done in two ways: (a) showing the superiority of your solution; or (b) showing the inferiority of your competitor's solu-tion. The customer gets a much better feeling from the former.

Fifth, the computer infustry ought to fight back.
Much of the problem is created by so-called industry analysts who need to find some-

al.

ld be ex prised to find the comp industry doing very well.

n addition, the phenome-nal growth rates of some segments of the industry during the last five years are not rs say positive

ry. We have provided tools to signif-icantly increase the informa-tion processing capacity of all but the very smallest busiall but the very sma

We have allowed whiteeductivity to in-wever slightly, in pnificant increases spite of six al paperwork aged to do all of very severe

uch governmental help.
It is time to take the offsive. Our conferences should not be on what is wrong with the industry, but on how to sell to business in a consultative manner; not on why sales are down, but on how to explain new technology to the uninitiated; not on why computers sit idle, but on

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happens that televisions make quate monitors — barely ade-ie. But that's it. onsumers who were turning to otex as interactive television in for swift and unsettling disil-

sionment.
Meanwhile, a funny the seed in the marketplace.
APLPS services — Knigh lewtron and Times-Mirro, and Times-Mirro, any — were launched wanfare and miniscule con

irea 1984 and 1985, as the early disappointing returns drib-dis from south Florida and South-California and it became clear neat no one had any interest in PLPS videotex services, the defi-tion of videotex began to mysteri-

ion of viscouez organisms silv expand.
B came to encompass ASCII textily services like Readers Dignst Assistion, Inc.'s The Source and Conserve, Inc.'s Compuserve, fasting accomplish from all the control of the contr

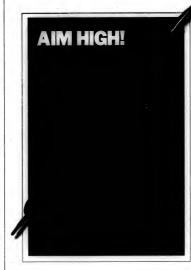
here's, the 's Computers's, feet-ywring garvious accessible from al-not any terminal. It stretched beyond the computer-cial and the stretched beyond the computer-tion of the stretched beyond the stretched district, as order to remain a viable mustale easily, the term came to sean just about any information sys-me that did not spit in the face of an that did not spit in the face of an By Videotex '96 this past May I'm usba — when purits KAPL'PS commer services had flooped ingior-ity everywhere from Missait to Cal-yle everywhere from Missait to Cal-yle everywhere from Missait to Cal-yle everywhere from Missait to Cal-rovers to mean all things to all ver-ors.

dors. Once Viewtron and Gateway shut down early this year, hewing to the narrow definition (consumers, graphics, dumb dedicated terminals) secesal pointing yourself into a NAPLI'S corner and effectively disputing the lessons emanating from the real world.

the real word.

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Boxed in by the parists, rejected by the many videotex was sever anything beyond on-line access for untilled many to information, communications and transactions. It was mixture as a revolution, rather than an extension of time shering and distributed communications developments that began decoder ago.



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Engineered Data Products 183 187 Engineered Data Products 187 Engineered Data Products 187	Senior Computer 50.57,86 71
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Females 100 100 100 Females 140-141	The System Center
Gardelf232	Daint Brokens
General September Systems 210 46	Tender 167 Tengen 167
Gotof Settlere 176 176 176 176 176 176 176 176 176 176	204 137 Services 87,114,160 Mark 22 44 Telesco 128
177 189	
Herris Monterresiding 50 113	To 100 has Software 110 187 187 188 198 112
Head Systems 126 25 Headywol Information Systems 220-221	30,183
	Decil 164
DE/accolaries 100-107	University Corp. 164 166
Information Bulleton 18	10   10   10   10   10   10   10   10
123-133 Managaratures 123 136	United 122 174 United Address 123 174 United Address 124 174 U.S. Rebelles 216 160
203 III	Wiener
Herselve Seatlers 126	VIII Systems Group
Instantional Computer Conference 163	100 144 101
J.D. Edwards	Wysel 174
Assept Cogne 170	Name

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## Celebrating the Computer Age

## COMPUTERWORLD

In the beginning - An interview with J. Presper Eckert, co-inventor of Enjac/ 3 A Time Line: the computer age/ 14

## COMPUTERS AND SOCIETY

What man will never design computers to do by Isaac Asimov

William F. Buckley Jr./ 27, Edward Cornish/ 28, Donn Parker/ 32, Peter Nero/ 37, Gene Amdahl/ 38, Carl Hammer/ 39, Sam Nunn/ 42, Dr. Joyce Brothers/ 46, Harold Shane/ 50

## COMPUTERS AND TECHNOLOGY

Machines may think better than but never the same as humans by Herbert Grosch

Raymond Kurzweil/ 58, Koji Kobayashi/ 60, Sanford Sherizen and Gary Marx/ 61, William Norris/ 65, James Martin/ 68, William Casey/ 70, Marc Garneau/ 74, Arno Penzias/ 75, Rod Canion/ 76. Bob Frankston/ 80

## COMPUTERS AND BUSINESS

Informational Man by August Bequai

Russell Baker/ 90, David Kay/ 92, David Kearns/ 95, Richard Crandall/ 96, Ed Esber/ 97, Gene White/ 98, Gendl Probst/ 102, Ashley Grayson/ 104, James Thornton/ 110, Adam Osborne/ 111, Ron Schneiderman/ 112, Harley Shaiken/ 117, Lillian Lyke/ 118, Martin Goetz/ 120, Dan Bricklin/ 122, John Diebold/ 124, John Imlay/ 128, Bruce Kula/ 129

#### HISTORY OF COMPUTING

Mavericks & geniuses of the micro age by Lawrence Magid

Philippe Kahn/ 139, Jonathan Rotenberg/ 144, James Beniger/ 147, John Keane/ 150. Edmund C. Berkeley/ 152, Robert Noyce/ 154, Gordon Bell/ 184

Historical Profiles: Computer kin/ 158, Charles Babbage/ 159, George Boole/ 166, Herman Hollerith/ 168, John Atanasoff/ 169, John Mauchly and Presper Eckert/ 170, John von Neumann/ 174. Thomas Watson Sr./ 183

JOSHUA LEDERBERG/25

CHARLES EXLEY/26 JOHN SCULLEY/36 NANCY BURSON/S

52 MARVIN MINSKY/55

JOHN ROACH/SE BORBY INMAN/63 HARRISON SCHMITT/67

WALTER WRISTON/89

COMMENT: PETER GRACE/SS KAREN NUSSBAUM/BE ROBERT ANDERSON/9 MALCOLM BALDRIGE/96

138 GRACE HOPPER/143 TIME LIME PRECOMPUTER AGE/160



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## SyncSort DOS One ament coolde deserves another.



## In the beginning

Presper Eckert helped launch the Computer Age in 1946 when he and John Mauchly invented Eniac. the 30-ton "electronic brain," at the University of Pennsylvania's Moore School of Electrical Engineering. Eckert, 67, still works as vice-president and technical adviser at Sperry Corp. He spoke with Editor George Наттат.



CKERT: I don't even know it

wit. I know that he hat it from Atanasoff an

g but never got any of it

#### w about Howard Alken's

ECKERT: As originally de-ECREMET: As originally de-signed, it had the principle of storage, which was already in tabulators, so that wasn't new. It had the idea of transferring num-bers from one register to another, but it was not done electronically. We were the first to do that elec-tronically, which is an important

tronically, which is an important difference.

The other remarkable thing about the Mark! Is that it idd no have the subrottine concept. If you wanted to do the same operation on successive sets of numbers, over and over, as you do in an integration of buildinities table you had to write out the program in machine language over and over again for each new event. that arrived on the tape — a straight linear program, with r

As far as I'm con





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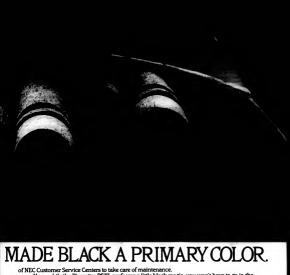
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BCKERT, Some idiots that tran the machine for a while down at Aberdeen tried doing that, and that turns out to be a flew way to began the control of the con

If a inymea sake who invented the computer, do you say Eckert-Munchly?

ECKERT: Yes. These other peo-ple didn't satisfy the conditions re-quired by the U.S. Patent Office for an invention.

in building Erdac, did you have a men of its Importance, much in he Wright brothers could feel the reams and importance of flying? ECKERT. We expected it to have

You built Enise for a partic

You half. Roise for a particular littley purpose. ECEERT. Yes, they had an over a cold of ballistics problems, partly ecause of new weapons. Also, neat of our high weapons wouldn't orck right in Africa. The ground maned out to be springier and the allistics tables wouldn't work allistics tables wouldn't work the state of the springier and the allistics tables wouldn't work the state of the st

Did you forecon the commercial applications to fellow?

EXERT: Oh sure, we were familiar with punch-card machines; if somebody could use those crude things for business, so certainly something better would have a clear application.

clear application. And just these is a frameon queri-tion that these that there was a underlieds market for only a dozen large computer systems. BURGET: It was size, actually. It was from Alben at Harvard. Be to the control of the control of the conduction. At the time I was in conduction. At the time I was in codinge, one view of applied mathematics was that the work of an engineer was to take a problem in the control of the control of the general control of the property of the control of the time of the control of the property of the time of the control of the property of the time of the problem of the time of the problem of the time of the time of time



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was that if we used computers to take all of the known functions that had been produced, consider the rate at which new ones were being invested and turn out books containing these thousands of pages of numbers, that would satisfy most engineering requirements, would satisfy most engineering requirements, which is not to be a supplementally the satisfaction of the contraction of the containing the satisfaction of the satisfaction of the containing the satisfaction of the satisfacti

chines. That leaves out bookkeeping, Apparently he felt punch cards would take care of that application for the foreseeable future. He was a very dognatic, clear-out speaker, a trumendous speaker — he could convince naymen in a room that he was correct until they walked out and thought about it more carefully the next day. He said this very forcefully, and the

next day. He said this very forcerizity, and us word got around.

He realized very marrow view of things. It was correct in the sense of what he thought about Dat there were many other spheres out there that he didn't consider. He later publicly retracted that statement.

tracted that statement.

Green Ropper worked for Roward Albers and last him to come down and work for statement and last him to come down and work for statement and last him to come down and work for statement and last sta

## Why were all of the early pro-

out?

EXCEST: We had grabbed all of the men we could to do the engineering, it was during the way, and arynoine, engineers were access. It was a formed to the engineers were access. It brought in me down for induction and times, and family it took a letter from the head of Civil Service and the head of ordinates to keep me the service and the head of ordinates to keep me the letter of the letter of the letter of the head of the walk, he defail' want to mend me. The local define department was intend— the head of it wasn't, he defail' want to mend me. The local defined produces the control of the letter of the l

war, and they naw no damn reason why I shouldn't be sent over.
Every time the head of the board wasn't looking, they had me drafted again. One day he was on vacation, and they draggind me in. That's the time the university got the letter signed by both the head of ordnance and the head of Selective Service. That's what it took So it was hard to get engineers who we

SO It was more to grant of defaults. Some of these women were quite good. Ka Muschly the wife of John Muschly was wor ing on the Analyzer. Some of them had been math majors, Some of the best programmers we had, though, had no more than a high-shoot schreadien.

#### Do you ever see Grace Hopper new? ECKERT: I haven't seen her in years.

#### Do you know how the term "bug" originat-

of?
ECKERT: I know how Grace Hopper thinks it originated. She telds the functiful story. As far as I know, this was a term in use by engineers, both mechanical and electrical, for difficulties in the equipment long before Grace Hopper ever heard of any of these things. What it amounts to it that it was a new term to Grace. I've never called her up and told her that that's note, but it is most. That term was in wide use before then.

Do you own a personal computer? ECKERT: As of a month ago, and just after I bought it I was sick for a few weeks, so I've hardly done anything with it.

What model do you have?



ECKERT: It's a Sperry IT, which is a clone of the IBM Personal Computer AT. It's mann-factured for Sperry by Missabishi Electronics Corp. It's sold also under the name Leading Edge. It has a few slight improvements, but it is essentially the same machine.

Why did it take you so long to get a per expeter? ECKERT: I didn't need it. I still don't ne it. I got it because they offered it at a very attractive low prior. I never liked the printers for small machines. They were too noisy, these dot printers and wheel printers.

## So millions of people bought perso uters long before one of the colorest

EXERCY. Why didn't I get one? Anything I had to do I could come in and do it on some computer around here, free and estated in I don't believe in the personal computer as I don't believe in the personal computer. as a person, in doing his income tax—particularly now that I'm simplified—or in keeping his household accounting records, needs that. I have about 75 real estate restal properties that I have about 76 real estate restal properties.

have about 76 real estate rental propert that I have to do some accounting on. B then, I couldn't justify a personal comps the little work that's involved there. The reason I bought a personal comp now in that I have some engineering pro on which I want to do some calculations home. The machines are cheap and fast enough now that I can do I

What abest word processing so a good homess of the PCT sos of the PCT ECKERT: Yes, that's probably the main justifiable reason. But don't forget, they're put-ting word processing ability in machines that are just small inexpensive word processing machines that are probably easier to operate

So the typewriter and the computer as a word processor are merging. As time goes on, I think we'll see dedicated word processors for people who don't want to get into anything

Or if you're going to play games on a per-sonal computer, I suppose that's all right, too. But that's kind of like a hula hoop — you'll get tired of that after a while I don't mean to say that someday the or puter won't be an important part of the bo

hold. I just don't think that's here yet.

## From what you're saying, it's not that the

From what you're saying, it's not that the power lant't there yet.

BCKERT: No, the power is there for what we've been talking about. But there are other applications: For instance, if I want to build a robot to dust the furniture without breaking the Dreadem doll on the table, I need a sophistied computer that opera

caided consequent that operation fairly fast in The point sain is that the more appeal row The point sain is that the more appeal row programming can be said also the more user-inessly the program can be said, a formal programming can be said also the more user-inessly the program on the said, a formal programming can be a said to be a said to be between bowey one and I like to do things and to the said to design the said to the said to the said and a said to design the said that one can be a said to design the said that one of the said to the said to design the said that one of the said to the said to the said that the said that the said the said that the said th al time

By you here a better search DECESTON, I have a trade to think of a better came. "Artificial instelligence" just dones 't covery much of anything. Also, it gives a last of mislending ideas. It's not settle a search of the searc

What kinds of applications do you expect from artificial intelligence or whatever you would fit to a call it? BUKERT: I bink it's going to influence most of our programming. But it's a speed burner. In robotics and in home computers, where you are trying to adapt to the way a human being thinks more and you don't really need the speed to do the basic artifluencie.

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to go? ECKEET: Oh sure. I'm not saying that the Macintosh has picked the

we wan have a lot of ideas artificial intelligence that ren't jelled yet; they're just pok-around, and we're trying to are out where to put them. If gie had formulated an idea at what they had wanted to do years earlier or maybe even 15 10 years earlier; they could have a it with vacuum tubes.

that it would work?

ECKERT: I'm not much of a wrier on things like this. I'm a pen that says if it doesn't work, who we have to do to fix it? We be a few things on a bench that we neve to do to fix it? We but few things on a bench that orted only a few months after w arted. When I saw those work d varied the voltages and fre-tencies and found out what the irgins on their were, I said that rest of it is just piling more of me grains of sand into the bucke til was see when he was the same til was see when he was the same till was see when he was the same till was see when he was the same in the same was the same was the same till was see when he was the same till wa

The first occasion that the al public had to see a large or or in action was Univer! take the 1952 presidential election

EXERT: Yes, I was there. In act, they got the results that preteded is landside, and the poeten and the second s

was right and all the com-ations were wrong, they used earbon copy to read what the size had done earlier. reryone said, "See, people t trust the machine, and the size was right, and the people

Of course I thought of that in connection with computers. Con-uters take the burden of complex ty off of us and leave us with the roblems of perplexity. The prob-ems that always keep us from noving to the next stage, in artif-ial intelligence for example, are

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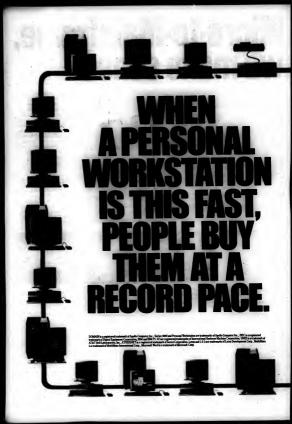
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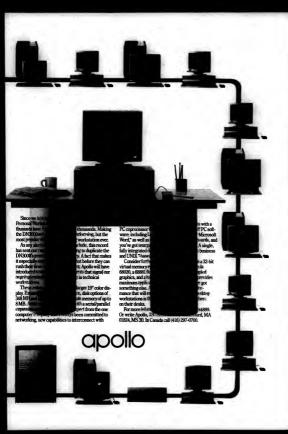
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# The computer age A time line, 1946 A.D. to 2000 A.D.



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n's draft on the





on developed by An ig, into a grid or me-providing a far er practical applic

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to the U.S. B

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omputer is comfirst 16-bit minico ta in parallel, inaugu-ing real-time comput-



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me a reality. Cobol, for Com nd Business-Oriented inguage, based on race Hopper's Flowic, is created by Co yl, the Committee on a Systems Languages, mopper invent a compiler that makes

ation ends e codes give way to etic tape procedural lan-





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on using a computer to win at blackjack. H. Ross Perot founds Electronic Data Systems Com

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Costing less than \$10,000 and oper from an ordinary power outlet, DEC's PDP-8 is ced as the first

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tch con

Computerworld, a wee



The third generation is under way, with integral ed circuits, floopy disks and nonprocedural lanning pro nent in computer cor ruction and usage.

re and Rob-

The first muti puter, HAL, is introduced in 2001: A Space Odys-

W. Carlos's "Switched-On Bach," an album of fugues and preludes played on a Moog syn-

ua Lederberg and iciates at Stanford sity create Denil, the first medical di-



ne intel 4004 becomes



Former DEC PDP-8 ch engineer Edson deCastro starts Data General Corp. DG introduces the first commercial 16-bit minicomputer, the Nova, just before DEC announces a 16-bit machine, the PDP-11/20.

The first robot supermar-ket, Telemart, opens in San Diego. The idea was that shoppers would use their Touch-Tone phones to call into a

computer that would help them select their groceries and have them livered. The supermarket closes because so many shoppers call that the computer can't handle the orders.



e of





e 8006.









es an art to build the Ma



@ & Los ies in

is introduced as



Microsoft Corp. is found-ed by Bill Gates and Paul Allien after they adapt Basic to the Altair micro-

blowed shortly by DEC's VAX-11/780 and rime Computer's 750. Tendem introduces the first fault-tolerant com-puter, the T/16.

Apple Computer, fou ed by Steve Wozniak and Steve Jobs, intro-



wn, N.J., under





the best-selling word

oduces the Wincheste sk drive, which stores 30 times more data then a small floppy.

CDC introduces the Cyber 205 to match the



ster debuts, and Micro oft's MS-DOS becom



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failures or operator errors, since retu-unicas a bunispersor, cash proof. Carach proof just a few applications. In fact, PROGRESS is so simple and fast to use, pro-grammers spend less time developing programs and more

ne getting work done

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DATA

\*Shipping additi



The personal comp industry passes the



The first computer wedding is performed by Rev. Ron Jaenisch using an Appte personal computer in California. The computer displays the text of the ceremony on screen, and the bride and groom indicate their

"Factory Robot Kills:
Worker" needs the
headline about the first
reported death caused
by a robot: Kenji Urada,
37, is killed when a selfpropelled robot cart in a
Japanese factory runs
him over as he tries to



Osborne Computer into duces the Osborne 1, the first portable computer.



naugurated by the intro duction of the Commodore VIC-20, which sell more than one million units.

A computer, in Washing ton, D.C., is used to help Nan Davis, a para-

TIME
Time magazine names
the computer its "Man
of the Year."



Jensey Carter is the first president to use a word processor to write his memoirs.

Walt Dieney Studios makes Tron, a movie whose main characters are inside a computer.

> here are 13 million omputers in the world.



Lotus's 1-2-3 takes Welcelc's place as the popular spreadsheet program marketed by company founder Mitch



Computer industry revenues reach \$55 billion, \$2.4 billion of it in per-



More than 4.5 millio U.S. students, most high school age, us computers in public schools.

Test versions of a biological microchip are produced by EMV Associates, a Maryland biotechnology company. Cadio / Baci computer CENTER lado Shack offers a not-size computer, the



testruments and Timex Corp. sell off computer businesses.

Software sales reach the \$1 billion mark, growing at 50% a year. Hewlett-Packard offers the first touch-screen overseal computer. the

> iales of home computns priced below \$1,00 at 30% from 1963 lev ds.

Magazines targeted to computerphiles number 450, the largest over devoted to a single subiect.

Technological trends and innovations include the use of IBM PC-DOS and Usic operating systems as standards, the start-up of fault-tolerant computer firms and the invention of the one-milion-bit rendom-access

The number of personal computers used in offices in the U.S. rises to nine milion, with an es-





Computerworld publishes its 1,000th issue on Nov. 3 with a special section orientating the computer age.

A state in search of a sloger, Massachusetts takes adventage of the large number of high-

the \$100 billion mark in revenue.

The number of personal computers used by U.S. businesses is expected to increase to 24.5 million.

Experts predict that computers containing the computers containing the concessors we technologically feed exceeding the port of the human brain.



The electronics indust is expected to be a \$900 billion-a-year burness, second only to a

The Industry's Best-Selling Fourth Generation Language/DBMS for Personal Computers Just Got Better:

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    A VT emulation mode that enables you to log on to DEC VAX machines, work in a full-screen mode and
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COMPANY

#### COMPUTERS AND SOCIETY

## What humans will never need computers to do

BY ISAAC ASIMOV

f we look into a peaceful future in which humanity manages to keep from destroying itself, it seems certain that computers will continue to develop and become more capable and versatile. Yet it is risky to offer to predict what a computer can? do, for one is far too likely to be wrong.

Arthur C. Clarke's most quotable comment is this: "When a distinguished, but elderly, scientist says that something is impos-

sible, he is probably wrong.

My distinction is perhaps debatable, but in an elderly as anybody, and I take that statement to heart. However, I am perfectly willing to predict what a computer wow 1 do, went it comid. But perhaps I should rephrame that and we will not be a supported by the support of the s

possible.

To see the difference between can't and won't, consider the automobile. It speeds along on wheels, which in turn rote on axies.

The wheet and axis is the rime invention human beings made that outdid nature, for no iving organism progresses by means of wheel out axise. These features may, in fact, be impossible in organisms because of the difficity of arranging a circulatory and nervous system to sourish and control a living, turning

The result is that while the automobile speeds along, we human beings are condemns to trudge — clumping along by lifting first or

And yet walking — up, down, up, down — has its advantages. Wheels need a reasonably smooth surface, whereas in walking, we can step over small obstructions and clamber over large ones. We can walk in underbrush, along narrow traits, side along precarious footholds while holding to a cliff side. These feats may not be an impressive as 60 miles per hour on a monoth highway, but if you couldn't do them, you would feet the restriction.

I magnic that it is possible to invert. a mechanical device that would lift feet rather than turn wheels. If as much energy and ingenuity were put into such a walking machine as has been put into the rolling machine, I dare say we could have very nice walk-mobiles. You

But who on earth would bother to design such a machine? Who would spend large sums of money in order to produce something that human beings could do easily for themsive? it can be done for free. To get into an undoub edily expensive machine and to have to put of money for fuel and for repairs in order to w menchanically in a kind of conspicuous consumption that would appeal only to psychot As a matter of fact, society has proven much more willing to build an incredibly expensiv metwork or highways in order to make the automobile wheel useful than it would be lik to spend on wall: mobile that might make

In short, then, automobiles are designed to do what human beings, without them, cannot do, or case do only with great difficulty. They are not designed, and never would be designed, to do what human beings could do castly and naturally without them.

We are most familiar with computers solvinathematical problems — carrying out arithnetic operations at great speed and with alnost zero chance of inaccuracy.

This is cereating sometiming minimal notings cannot do. The human brain, while capable of working out mathematical problems, does so very slowly and tediously and with a distress ing aptitude for arithmetic or logical errors. Therefore, we welcome computers in this respect, and we labor to design them to work on such things faster and faster and fury to make them capable of tackling problems of ever greater complexity.

And why not? We don't need an automobile to go from New York to Chicago. We could walk the distance — but it would take us a great feel of time and effort. Better to use an automobile and design high ways and signs and turnoffs and more economical engines to do the

job even better.

We are not abandoning anything vital in
turning mathematical operations over to a co
nuter. We are merely exchanging an older is

being and that before the computer, hum beings proudly solved problems by thems Not so.

ably intalligent and theroughly educated, ox exercity do anything in mathematics on his own. If you don't believe that and consider yourself installigent and educated, then divide 7.8,847 by 528 to three dectnal places — in your head. I doubt that you I even try (I wouldn't), and you might even walk from No York to Chicago in less time than it would tal for you to get the right nameer. And yet that

All through history, we have solved even simplest mathematical problems with helpwith our fingers, with pen and paper follow memorized rules, with an abacus and side ru and mechanical calculators. And now we hav the computer, which is better than any of

Anything for which we can work out clear and complete instructions and that human b ings can do only with difficulty, if at all, will

handed over to the computer, and rightly so.

What about things, though, that human be ings can do easily and, yet, for which it is extremely difficult to work out clear and compute instructions?

Chees is played with 32 pieces of six differnt types on a board containing 64 aquares in eight-by-eight array. Every different chees nam has a particular position at the start and an move only in certain simple ways. All the ules can be written out, and yet, desirely years





a grand master, A computer cannot best Kar-pov or Kasparov, let alone Bobby Flacher. It may some day, but it can't yet. Why is that? Well, despite the fixed and simple starting positions and rules of move-ment on a small board, the total number of possible positions and movements is unbeliev ably enormous, and we still can't get a compe or to check all the possibilities in a reasonable

But, then, how do the chess masters do it! Ah, there you have the problem. We don't cnow! What's more, the chess masters don't

know. What if you take a more complicated game What if you take a more complicated game The English language includes hundreds of thousands of words, and it may be that I hav at my easy command 10,000 to 20,000 of the I have, then, thousands of words instead of a few cheamen, and the words can be put to-

common or work, and it may be that I have in one of the control of

I can turn out this volume of material — and that is by writing as quickly as I can and getting it nearly right the first time. I do very little revising.

little revising.
Thereis, you can well imagine, very little
time for me to think, and any thinking I do
manage to do has to be done very quickly.
Well, then, how do I do it? The snawer is
simple: I don't know how I do it. I haven't the
faintest idea. I only know I have been able to do
it sincer my teenage years, without being taugh

the state of the control of the cont

ght answer ought to be. This is done all the ne in business, in administration, in science, literature, in art. You might argue that this sort of cressivity, is instinctive shility, this talent — or even nius, if you will — is confined to a very small action of the population. It certainly seems to

... A DOCES IN

HANDS-ON

Because we have at all but a short per

ney have had to do un-id muscle work, they had to do trivial men-ork, they have had to

for promises to be the most humanizing invent history. If will take from the suffering shoulders and minds of humanity all those tasks that human beings cannot do well.

ble, as computers are de-signed to be more and more versatile and to become ca-pable of learning by their mistakes, that in the end a computer might be able to take over those tasks that are peculiarly human?

use precluitly limited. If we will be disagreed to the control of the control of

Computers are simply a necessary

ing, they are

THEODOR NELSON from Computer Lib



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- 55% in TTime:
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and sort operations have to be hard to be good? (3) "MISTER SOFTWRENCH" SERVICE: We've got the best pit crew in the business. More than 85% of all customer requests are resolved within 24 hours.

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## Joshua Lederbera

#### Tying minds together to advance science and social intelligence

obel Prize-winning geneticist Joshua Lederberg developed the expert system, Dendral, with Edward Feigenbaum while at Stanford University in the early '60s. Dendral, the first applied use of artificial intelligence, interprets data produced by mass spectrometers to determine molecular structures of unknown compounds.

For the past eight years, Lederberg has been president of Rockefeller University, a New York City-based biomedical research institution

founded in 1901 as the Rockefeller Institute for Medical Research. Lederberg spoke recently with Computerworld Senior Editor Janet Fiderio about the impact computers continue to make on education and society.

tation is well known. But what has been perhaps a greater inter-ect to me — and this is the thread that goes through the work idd with Ed Petgenbaum at Stanford — is the use of the computer in the communication network as the technical sup-port for improving the social system of scien-tific advance. It's a way in which minds can be brought together more effectively and make an effective use of the expertise that is present

sepact systems as white?

DERBERG: They will allow you to be at ate of the art. If you have sutheritically red the expertise that is available on the t, you know you're not reinventing where doing; you have suthentic, well-craft.

when you're putting together your production rules and so on, you discover there were incon-sistencies in what you put in. It's better found at that logical level than when the bridge

You might call that criticism rather than eativity, but I think we have to keep in mi at with any scientific advance or cultural e, that these two have to be kept hand-inhand. We need a lot of imag to be checked by criticism. authenticity to self consist

aceld?

LEDERBERG: Anywhere there is a library, of anywhere there isn't a library and there out be nout be not been to the could be, such as when the expertise is informal and not that well codified. Expert systems a way of writing expertise down and thing at the experts before they disappear, sension library published a core on expert systems in factory manager.

Will us forget the same become too depende on thour?

LEDERBERG: I suppose the first person who came along with a book would sak the same question: Are we going to be too reliant on this stuff written down and forget to re-member stuff that we get through the oral

of course, there is a danger, but I would say ere is no other way to manage the enormous pansion of knowledge, no other way to unter the trap that we have laid for ourselves — the trap that goes under the label of specialization — without this kind of help. Look where we are now. Knowledge in genas is much too complicated. We have pos-emmunications with colleagues in other pids. That's not a very satisfactory situs a have systemic errors that come out of

inadequate communication. You can find it

LEDERBERG: There are still some very LEDERGÉERO: There are still some very hard problems that we never quite tackled, but I think our efforts would have been premare for some of the reasons given here. There are severe hardware limitations even now, which hut effectively getting into things like learning systems, which is the next horizon. We ve had a little estar at that, a thing.

ndral, but the hardware just isn't up to it yet. What are Medidendral and learning systems? It's a way expertise can be learned by a stem by looking at raw data from the out-ide world. Learning by experience is what I'm

side world. Learning by experience is wma.i in trying to say.

The first stage of expert systems is to learn from experts. Yoo ask yourself how the ex-perts learn, and a great deal of that is intellec-tual, learning from other experts.

But some of it, new knowledge, is gotten by experience. This part includes laboratory ex-periment or other sorts of data, the induction

erlise down d getting at

efore they



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Administrator.

ial sys

disappear.

er in there, you'll have some other disweit pushing the buttons. It's the complexity in the system, not the machine, that's driving it, that leads us to these frustrations. It think we need to have a realistic approach to the capabilities of what these nodes are. One needs to understand the limi-tations theroughly, but one also has to ask what the alternative is. There is no neares.

If it's not one ovil, it's another? LEDERBERG: Yes. And I think, best of all, there's some balance where there's the possibility of hu-man invention. . . I think a cross-check with a larger set of expertise. It's involved in human judgment and communication with other indi-and communication with other indi-

od communication with other indi duals and so on. In a world with five billion, and so billion in a very advanced stage tachnological and economic orga sation, I think that's where the

What about the question of retain of personal privacy? LEDERBERG: I don't think we

LEDERBERG: I don't think we can live in a complex notely and have the efficiency of transactions without sacrificing privacy. The underlying problem is that you want to have credit, you want to be able to go to far away places and have them recognize you instantly as someone who is credit worthy. Of ourse, you've joing to have to sacrifice something to make that possible.

We do need to maintain the integrity of the credit checking system mixtures are the credit checking system maintains in it. We want to leas over backer sets to make mer of that. Concept with jointain and the chings computer system cas do is the things computer system cas do is a lovel where there may be a temporary to protect individual and the concept with joint on credit the concept with the control of the concept with the concept

face up to the fact that a world with five billion people doesn't have much latitude for privacy, and we'll have to be asking ourselves is it really so important that we would be willing to give up other values? Of course, there is no answer to that question. For the most part, it think the questions about privacy are incedimate. I don't see the setu-nality of abuse as much as probe's

na occision, not a knological one, at abuse might be

You have infor-ation that's in the **Expert systems** TO G Way of

is of a political ority, and it can sed to blackmail

individuals are, not about what their privacy is in the first place, but what abuse is made on information. I would advocate that they be a supported to the support of the

be more transparent, and they al-ways have been if you get right down to it.

down to it.

There's a change of dimension with a broad range of people having access, but that also means you have a better inportunity to divide your correctives. I would come back and sdd that if you try to tally up all the abuses or grivacy there where in this monopy society, I don't think they add up to a hill of beans. But people are worried about it.

Why do you think there are people out there who are all airside of complete?

LEDERBERG! I think their real unger and anxiety is about the conjectity of the social system. The computer is emblematic of it, it's a major instrument of social administration, and that is a constraint in a contrastion to the conference of re it is.

there it is.

The understanding of the role of computer-based communications systems is a way in which people can work together more effectively. We should be keeping our eyes on the objectives in computer advance-

COMMENT

I-N-T-R-O-D-U-C-I-N-G BULLETIN

# Conservatives, collectivization, computers and originality

Computer technology is an enhancement of individuation, not its oppressor

BY WILLIAM: BUCKLEY IR.

Sa political conservative presumptively opposed to collectivization, I am sent
many unfriendly references to
computer technology, some of
them even mutinous in inclination. One correspondent suggested
that I urge all recipients of IRS
forms of the kind that arrive with
little slits in them made, clearly, to oblet company. In other control of the co

forms of the kind that arrive with the title slits in them made, clearly, to oble conjuster, to pell out a pair of actions and to the confidence of the conf

purpose whatever. In a public argument I had with Prof. John Kenneth Galbraith a few years ago, he contended that the advance of the computer required great social protections from the state. I insisted that the opposite was the case, that the individual's protections were being heightened, even in the commercial

world.

well of which would be four advanced in schooling, size of which would be for further individual interests as not to serve individual tastes, ought to be welcomerative. Because of comparint schooling, on concernative, the content of comparint schooling, on the properties of the schooling of the schoolin



tive entrepreneur would quickly have gone into reverse gear, aborting that aesthetic disfiguration w all jove to hate.

The argument carries forward to the question of

The argument carries forward to the question of individual identification codes. This is a great crusade among many conservatives: They shall not give us identifying members!

[Mail: a the firm inco. "then" have almost vices.

point, surely, is, How do we explain the argument that individuation results in collectivization? isn't the other way around? If, at birth, I am assigned it number 34,933,645 (which happens to have been r serial number when I was drafted), in what way is that a threat to my liberty?

to merchandisers, who think about customers in intersecting units (over 40 years old, under 150 pounds in weight, lives east of the Budson, rearvewest of the Minsintippi, one spouse, one lever, res 1.5 books per year ...), but is it alarming to knot that computer technology stores up more statistic about us than are incown to our mother? Still, I so

Bockley," went on to recite the awful legal ordeal of the patriotic William F. Buckley Jr. in his fight against compulsory unlocalsm and went on to ask for "a minimum of \$10" to belp with legal defense. The letter was signed, "Your fellow believer in individu

So? These things happen: But the appeal in que tion, which raised a few thousand dollars, might a have raised a few thousand dollars if we had not been efficiently submissive to computer technology and the submission of the subm

score and 10 years on earth, I receive one, maybe even two, more letters, written by me, about me and addressed to me, I shall weather the depersonalizations of the computer age with all due calm, attained that the text of any letter signed by me will be appropriately complimentary about me. Provided the text is properly complimentary about me.



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technical for the user to learn.

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BULLETIN

#### 'Did you hear the one about the human who . . .

Our belongings may begin talking among themselves even when we are not present

BY EDWARD CORNISH he computerized homes of the future may have more "smarts" than the people living in them. But the people won't mind, because all of the electronic intelligence will be devoted to making them happier. Computers in our homes will do all kinds of things to make us comfortable, safe and well informed. They will also help to feed and entertain us - and perhaps

even give us our baths.

ment."

Purniture will also talk to us. Tou may find that your dining room table talks better than some of your guestic lit may not eay much more than things like, "Are somebody's ellows leaning on me?" But you could program it to tell

uil.
You can't get a talking table at your furni-re store yet, but your automobile dealer may all you a talking car that mays things like, Fasten your seat belt." Since the busic tech-



cloth and stu ing; If has be-

come aud

ORTIMER, PORWARD

and even areas us.
The computers and robots will talk to each
other, of course.
A floor-cleaning robot may ask a sofa to
move so it can clean under it. "Sofa, move"
After the robot is finished, it might say, "Sofa,

The sofs and floor cleaner are both rot d that illustrates several important pol out the household robots of the future.

Do not consider the design of the will be designed. So the hamman for bratance, robot servans of the hamman for bratance and the hamman consideration and the hamman for manile children. A robot that cleans rugs will be designed on at that task and gerbage a few others. As no bratan hamman for the hamman height of the robot will be designed broaden and the hamman height of the robot will be designed or other notes of tasks. In abort, our future some will have both of different kinds of the hamman height of different kinds of the hamman height of different kinds of the hamman ha

A said that can respond to a ent, we may begin to ex-ce our homes in a very event way. We will feel counded by mechanical nos waiting to obey our ry wish like perfectly ned, extraordinarily ca mand is not just dead wood,

it companies will be at time saver for busy is, who will be able to up their groceries all taged and ready to be ed in a car — or have a delivered. If the order mitted easily is

nat's the point it mirrors the pitfa area an a procurse convener. fet, technology is moving so fist these days har you're likely so wind up with oundated squipment in the middle of a lease. In effect, ou're age to get stuck with (and stuck paying for) improductive assets just as though you were surchasting them. Solution: Bysitable Life Leasing. Because we can draft a "BKS 13" Operating Lease that is so specific—so suited to help you grow your business—that it can anticipate equipment upgrades, modifications and even replacement during your lease term. So was can write the property of the control of the control of the solution of the control of the control of the solution of the control of the control of the solution of the control of the solution of the control of the solution of soluti Have an account representative contact me toda

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entry of individual characters will be eliminated. Concern about the universal, de-centralized data base system is wel-id. It could pose a massive threat to people through violation of permitted is not appropriate intra-tions into business, government and other institutions. Major ad-vances must be made in informa-tion security, control and integrity. We require the freedom from

HANDS-ON

Uncovering politicisms' hidden personalities

#### COMMENT

JOHN SCULLEY to Computer, Inc.



#### Making music with help from a PC

#### BY PETER NERO

My Tandy Oru, TS8-00 Model I, which is now packed and saved for That feet should convey the speed at which I reacted when the drawn reality. That feet should convey the speed at which I reacted when the drawn reality. The er an which I give no was rife with predictions of a Buck that the future would happen in my lifetime was too good to be true. On yill has add Sysmet of working toward perfections as associated, to reality, I had achieved a good and not a reality, I had achieved a good and not a reality, I had achieved a good on and a command of the control of the cont

sion and a commensurate amou of skill. While we, as artists, alor ann. while we, as arrists, as-ways hope to continue to grow, the quantum leaps take place at an ear lier age and subsequent growth seems to level off at a comfortable.

seems to level off at a comfortable, though lesser, pace. Therefore, imagine the challenge of sitting in front of a keyboard with its powerful pobential and feeling like a complete idout. This was one keyboard that now had a true novice for a "player." Slince hardware always seems to be available before software and I

Since hardware always seems to was in no mode to was the novel but had complete to was still in sovice but had complete to was not in novel but had complete to was not in not be not in power and most had her. It was not work in good was the not in power and most had her. It was dready proposed that it was a complete for public was not work in power and most had her. It was dready propriets was rapid. In the control of the control of all professional profession

Lakes extra care in memory conservation and is agood exercise in improving one a skills.

Like most others in my field, I have a personal manager, agent, because a more consensual and the state of the

grams as part combinator lysisation through grams as part combinator label programs until the following contents the will of the players, the programs until the programs until the programs until the programs are proportion performed by many through the proportion performed by white parties. Proceedings the programs of the programs o

lists and so on. What is seen to see the community what is wrote contains a data base of my repertoire as well as a record of all previous concerts played. It compares the two and deletes from the data base all selections previous contents played, and the compares the two and deletes from the data base all selections previously played. Prom the remainder I can

played. From the remainder I can ask for an opener of, say, between three and five minutes' duration, fast tempo, not on difficult and appropriate for the occasion. In a few seconds, I get my pick. This process is repeated for the rest of the program selections, using the variety of criteria I have made available, and in about 15 minutes, the onco-ardious staik is minutes, the onco-ardious staik is

Now I can go back to practici my craft, which, until recently, took a back seat to paperwork. Happy birthday, Eniac!

66 Computer: One who com putes; a calculator, reck-oner; specifically a person employed to make calcula ons in an observatory, in

#### COMMENT

JAY PORRESTE or of management at MIT's Stoan Scho

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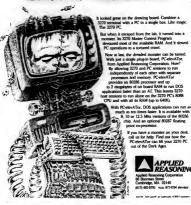
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E. B. WHITE





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PC-elevATor can lift your 3270 PC out of the Dark Ages.

REASONING oning Corporation

#### From automated to cybernetic social systems

#### BY CARL HAMMER

Scientists the world over are facing an aw some responsibility as their work brings the some responsibility as their work brings the by irreversalish alterations in over arthly en-ronment are taking effect. Some of these changes, such as in the temp ture of our atmosphere or of the oceans, resu-ing technology produces. Others could devel from plasmed experiments of a global nature such as redderivation of the water on the su-sech as redderivation of the water on the su-

further because of the excessive in power heeded. In the case of the excessive in the case of the excessive in the excessive in the case of the excessive in the excessive to 100,000 decimals. Therefore, let us beware of attaching the label of impossibility to achieve-ter and the excessive in the excessive and the excessive in the power in the excessive in the

s, or computing recipes, in order to greater speeds than interaction of human is and electromechanical calculators had

operators and some and furnished in the past.
These machines, designed to augment man's mind, gave him almost at once a leverage factor of 10,000 (with the invention of the Raiac), and today's supercomputers provide us with an ad-

The outlook is very bright indeed if we lust learn how to make inent use of our notalways-so-intelligent and often mallaned

cybernetic society. By the end of the century, electronic systems will affect and even control practically every sepect of human endeavor. Every person will have then at his or her disposal a vast complex of computer services. Information utilities and data banks, for example, will make compoter power available to the public in the same way that electric or

66 Your home, and indeed some Cadillacs,

DANIEL SIEWIOREK

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Ann Landers as outparal ma

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ORATION

om is now a decision of KMW Corp. -

65 The basic set of abilities that we call 'thinking' it is something humans share a little bit with their cast is something humans share a little bit with their cast with their comparers. When appropriately programmed comparers such their comparers such their comparers that the same kind of highly selective teached among possible of inferences I see my friends making. Computer have the capacity to a sembly of recognised patterns, and the information the same selective way that humans do. So I see no reason to use the word my reason to use the word willing to apply it to committee the same selective way that humans surface I'm also willing to opply it to committee the same selective way that humans surface I'm also willing to opply it to committee the same selection willing to opply it to com-

humans unless I'm also willing to apply it to com-puter. Viewing comput-ers in this light can be airly supesting if your life made worthwhile by the hought that humans are different. But maybe only made to the look for one's values in life. Maybe we ought to look at the world in terms if what we share with the set of nature rather than looking for that uniqueness.

HERBERT A. SIMO?

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#### HANDS-ON

Cleveland writes a prescription for its electronic city

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Related of the decima, which constrained free effection eather of the option in the property of the constrained of the option of the constrained o

off Appin Computer, Inc. Appin II+ microcomputer in a plane line with a 200 let/inc. Hayou liferrocomputer Products, Inc. Microcodem II and at up the bedieth board so that beenly and dueff boated in the vac-

out clinics could communicate with each other. Sunchey, though, the number get out and people from or ride the university started leaving monages.

in and of Badd, that would not have been supprising, says Them Grandent, assistant professor in Richard of Medicine and creater of

the best and beautiful access to the beautiful beautiful access to the a

mys, "I thought, Whit a mirrote, there's recenting interesting join on here. Puspie are using this bulk its board to reach out for information and assistance."

the phenomenon, Grundher est down and wrote a program to accommedate these outside users, complete with messes and Belp acreems. This new system, called "St. Skiece's Hospital and Informs

th the public and other medical refessionals in the Cleveland area February 1985.

ex" feature, formalized the sposts county members who were certifianalty members who were certifiandly practitioners were deposits a monitor and respond to inquiries rith general information. They were specifically instructed not to

Response to the system was rapid and enthusiatic. The St. Billion's Bospital line logged more than 100 calls in its account week and eventually reached an average of 300 per week. According to Grundner, the questions saked fell into three general categories: ones that should have been posed in a doctor's office

gariety answered, once that callers little and to sak their own doctors because they seemed too trivial and cases that callers would have had difficulty satisfy face to fice. Just on E. Millory's was heritaris.

difficulty saling face to face.

Just on it. Silicon's was beginning to streach the limit of its facilities, AT&T information Systems heard about the project and offered 486,000 worth of computer equipment and software.

The facility was equipped with

The facility was equipped with an ATAP SER/400 composer with 4M hytes of random-econo missor, and 144M hytes of random-econo missor, and 144M hytes of hard disk storag as well as 15 1,800/800 bit/sec. so desse and enishes—written Usia conductor wars. With those restructors, Greather decided he had the makings for not just an expanded electronic model and the latter was the model facility, but eventually as matter electronic city.

That city is now a resulty called the Claveland Pres-Net. Opened officially July 16, the Pruc-Net Is a free and open-access consumsative conspects or system supported not just by the lattical ATAT demantion but also by contributions from Case Western Bancer's Rebosel of Medickies and university hospitals as well as a hoot of other organizations and Individuals throughout the greater

Accompt outsetting continuous, Convolund Prus-Not already possumm much of what one would expect of a brick-and-mortar town.
"Every city has a post office, and so
do wr.," Grundmer says. "We provide free electronic mail service to
suryone in northeast Ohlo who
wants to register on the system."
There's also a courthouse, where
volunteer law yers answer users'
volunteer law yers answer users'

questions about the law, a government house, which is an electronic connection to elected loosal, state and national officials; seaf a schoolhouse, which is an electronic communications system allowing both information exchange among Cleveland-area schools and the creation of common dama bases that can be accessed by teachers, administration, attributes and rearneds.

"When you start thinking about something like this in terms of the metaphor of a city, you realise that the possibilities are practically endless." Grundner says.

Grundner envisions similar free community computer systems apreading across the country. The Cleveland Free-Net is ready to do it part to help. Qualified groups from any other city are invited to lease the software on which the Free-Net is both feed to each to the first the contract of the country of the contract of the country of the contract of the country of th

The computer is the brain outside the brain. With it, we extend our minds in a way that will make a better world for everyone. The pessimists are wrong! More people can live better than ever if we just apply the kuman mind for

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Computer Corporation of America A Comment Com

#### When logical computers meet people's emotions

DR. JOYCE BROTHERS

We're in a new computer age. Dad works with a computer at work. More has one at home to hely with budgeting and marketing. Th kids work on computers at achool and play games on the computer

nd play games on the computer hen they get home. It's a whole rew happy world. Then why is everybody so tense? Thy does Dad retire to his study at

he end of the day and not talk to nybody? Why did Johnny throw is chair through his computer creen when it rejected his commands? San Diego psychologist Thomas

age. s highly technological thing in t

lives of people who are unprepared for it," he explains.

McDonald as w so many of these clients that he met with the San

Diego Data Processing Association and saked them about the stress that computers have brought into their lives. "It was like turning on a spigot," he says. "Nobody had ever saked them about stress before."

ing with computers.
Computers are logic only, McDonald explains. People are emotional and applicated, too. When they work with computers, they have to discout these has public for discout these has public for eight hours a day, day after day, they may frough thou to be emotional and spiritual. They may find it too difficult to relate to a pouse and

they retire into the study wit

Life with a computer in the office isn't casy either. Not everyhody has a computer, and those who don't rarely understand ther They think you have a magic machine and should be able to per-

enine and snouid be able to perform wiracles on it. When you can't, you get frustrated. McDonald finds that bosses and businesses tolerate a great deal more problems among people who work with commuters than the-

work with computers than they would tolerate among other employees.

People who work with computers have to learn how to relax, deDonald says. He suggests pro-

Learn to socept mistakes, he says. You're human. You're human. You're falli You aren't a computer. Tell your beas and co-workers to expect m takes, too. Computers are with a to stay. McComputers are.

what's bad, McDonald says, when businesses and the people who work with computers forg that people are more important

hat people are more important han machines. Always. Boys, girls and competers

Rarely do you see girls or wom in a pool hall. That's a male domain. So, it turns out, are video arcades, where many boys get the first experience with computers. This observation comes from researchers Sara Kiseler and Lee Sproull, of Carnegie-Mellon Univ sty, and Jacquely yme Eccles of ti

They observed players in vides arcades in Pittsburgh, San Diego, Atlanta and Tel Aviv and found anywhere from twice as many males as females to eight times as

"Video arcades are places where adolescent males hang out," the researchers conclude. "Occasionally they bring their girffriends, but the girls watch while the boys play." Committer camps also attract

mostly boys, as do computer programming courses from preschool through high school. Does this means that girls are less intereste in computers than boys are and is adont a working with them?

in computers than boys adept at working with the That's the conclusion educators, a conclusion women at a disady-relation

the world of tomorrow.

It is estimated that by the 1990, microcomputers will b mary work tool in a quarter

mary work tool in a quarter of jobs and that 10% of U.S. how holds will own them.

It is true that fewer women

men enroll in freshman computer courses in college and those who de don't do as well as most of the men But Kiesler, Sproull and Rocles say this fact can't be attributed to gender of freshman.

The few men who fare poorly computer courses are those who have never played computer gas or had previous experience with computers. That's a little over a quarter of the men who enter college but almost half the women. The researchers have found that it's the students who have players are the state of the state of

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no womer they sometimes seem out of control.

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ment. It a single, comprehensive package, VMCENTEZ combines everything you and your staff need to maintain your sanity while surving more better than ever. VMCENTEZ simultaneously implifies DASD management, resource scheduling, workload balancing, system accounting.

worklood balancing, system accounting, diseaster recovery, and more—all within a consistent, featible security framework. The results: Basic compliance with send-user demands. Improved mental health for your system staff. And a smooth-running data center that it help

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#### Kids speak out: 'Computers can be good or bad'

CATHY DREW



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In Europe, Asia & Africa: Hostoms Group Ltd., 130 Shaftesbury Ave., London W1V 7DN. Telex 893529 Worklands was designed by the BM PC, X1, A7, 3270°C and compatibles, the DEC Rambow, and the Wang PC Registered hademans.

## Educated foresight

BY HAROLD SHANE

The silicon age into which our plant is moving requires significant changes in our modes of testing and learning. A number of desirable educational innovations have been proposed in a variety of publications, such as A Metion of Riski (1983), compiled by the National Commission for Excellence in Education, and the Carnegle Task Porca report, A Nation Proparest:

(1986).
There is, however, one point that has not been adequately mentioned in the literature. This is the need to develop in learners of more

foresight."
This foresight is one by means of which people can move beyond the silicon-estimulated information society and achieve an applied knowl-

sportant because of our need to see intelligently with information verticad, sometimes called "info-

was stressed by Professor Daniel Bell of Harvard University, who recently estimated that the rate at which our information is accumulating in likely to double every two

The attantion of eccasion fornight involves creating policies that will enable us to convert information from our computers into intelligent policies and practices. This conversion is particularly important because computers neither understand what they do nor care

Unless artificial intelligence fulills certain remote and perhaps milikely possibilities, warm, carertain to remain crucial elements the societies of a planet with the spacity to destroy itself in a nulear Armageddon — a Day of underseat see dreafful to contem-

plate.

Educated foresight must encompass an understanding of present and potential problems on the world steam the model steam to the problems of the problem

world scene, the revolutionary ten po of rapidly changing societies and the implications of our alliconage ingenuity, for instance with respect to the increasing importance of the roles of computer-directed robots in the workplace and the

Achieving the foresight we deperately need means that our schools must become creative learning centers serving people or all ages rather than merely function as repositories of informatio from times past.

Furthermore, our rapidly grow ing stockpiles of knowledge mear that individual and creative learing must be a lifelong process, on that helps us continually to under stand the complexities and policy decisions inherent in such condi-

The increase of internations interdependence mirrored, for instance, in the roster of African di lemmas stretching from Cape Hot to the Mediterranean Sea.

Shifting world markets.
The birth, in 1986, of the 5
billionth human.

armament and ways of coping wit endemic terrorism.

Threats to the unique nature

A U.S. debt in excess of \$2
trillion plus vast debts owed by
many developing nations.
 Medicare costs of \$1 billion

minally ill.

# increasing adult illiteracy in America, with an estimated 17 to 21 million people unable to pass

busic literary test as of May 198 according to the U.S. Cessus Bureau.

'Anticipatory binduight'

tiny sample of the developments mandating the need for educated foresight. We also obviously need the skill of "anticipatory hind-sight." Here I refer to learning from the spectrum of development in recent years so that our hind-sights also help us to anticipate and

sound future courses of action. We abould be able to avoid repeating past errors reflected, for instance in faulty water and land use or in our pollution of the atmosphere. To sum up, let me say that a decent, humane future, perhaps our very survival, depends on our

decess, humane rusture, pernage our very survival, depends on ou developing a new kind of Ra a higher and a constantly updated as our accumating computerated information becomes knowledge and — hopefully — is transformed into the wisdom I believe can be fostered

Shane, a Distinguished Ram Professor at Indiana Universit worste Teaching and Learning is Microelectronic Age, being published this month by the Phi De Kappa Prundation.

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#### COMPUTERS AND TECHNOLOGY

## Machines may think better than, but never the same as, humans

BY HERBERT GROSCH

production, natural language analysis and synthesis. The enthusiastic proponents admit that superb machines will be needed but claim with some justification that limits on hardware

e are promised miracles of computer intelligence - real voice recognition, automatic expert system



#### HANDS-ON

#### Recreating the Star Trek' story

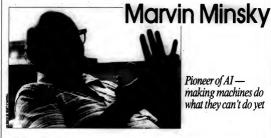
tion stored in one language of trieved in another. U.S. and I in computers can be program alk to each other without tra tors or trust in each other.

33

in 1985, IBM announced the new 3480 drive that gave us the first dramatic drive that gave us the first dramatic change in computer tape media in thirty years. But the incredible performance of this new tape...six times the recording density of conventional reel-to-real tape...depends on the latest Chromium Dioxide (CO.) particle technology. And BASF has pioneered in this technology. for thirteen years. We're the world's largest producer of CrO<sub>2</sub> particles, and have more continuous experience with CrO<sub>2</sub> magnetic tape than any other company.



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Backod by a 5-year vigaranty, BASF Chrome Tape Cartridges are now available in quantity for immediate drivers, which was not to be compared to the tape you choose to day, your long-term choice is BASF.



Pioneer of AI making machines do what they can't do yet

IT Professor Marvin Minksy helped organize the Dartmouth Conference in 1956, where the term "artificial intelligence" originated. In 1960, he founded the Artificial Intelligence Project at MIT with John McCarthy.

Among his writings is a paper written in 1975 called "A Framework for Representing Knowledge," which set forth the concept of using frames as structures for organizing knowledge in natural language and vision systems. Computerworld Senior. Writer Michael Sullivan-Trainor interiewed Minsky at his MIT office on the present and future potential of machine intelligence.

- wer definition? NSKT: Well, I don't believe in definitions, sople seem to want them. Al is making ines do things that they can't do yet, and e use the word intelligence for it. It to me that intelligence is just the things scople do that they can't explain, so it's thing. It's a way to solve problems.

- Are there any machines that one can say "think" new? MINSRY: Thinking is a matter of degree. Some machines solve problems that people find hard. There are lots of things machines can't do yet. No machine can tell a cat from a dog by looking at it, and really no one knows

- how hard that is. When finally it's done, it might turn out to be easier than people thought.
- What is your office's for measuring when could be said that a machine can think? MINSKY: There isn't any, it's like saying How can you tell when something's alive? I look at a strand of DNA some people wo say it's alive, others would say something a life not a clear-cut thing. There won't be a point at which machine soddenly think. They'll get more and more mind like.

- re isn't any scale. There are

- solved problems of calculus, and at that time it got an A on MIT calculus exams. This was is got an A. on MT Calculous exame. This was very suprising because people thought of cal-culous as now of the great archiveractors of the culture as now of the great archiveractors of the theory of the control of the control of the control of the too of the control of the control of the control of the thought was very advanced, requiring a too throught was very advanced, requiring a too was a second of parts. And making a manager than making a program that could do stepic assemblies of parts. And making a manager than the could be stepic assemblies of parts. And making as can set in still beyond a program that could do stepic assemblies of parts. And making as can calculate the country of the country of

- Things that seem simple to us, like recogn objects, require tens of billions of neurous brains; and doing things like college culus probably require very tiny portion
- our brains.
  It's harder to get machines to do the things we do without knowing how we do then. I think in the next hundred years, we will sarate the things that seem simple, and are on the things that seem simple because we serit tremendous computers in our heads scialized to do those things.
- - sextang machines to learn to use language is something that is going to move rather stead-by over the next generation, and it is difficult to predict what problems will be encountered. People are trying other ideas about making the machines learn, such things as not conces-trating on the structure of the language itself, but instead on how we learn. This movement,
  - than programming. It's a wonderful idea that if we can make a hine that has very broad learning capabili

speech.

But then you'd need other parts of the brain, which I'd call agents, that learn from experience which of these specialized parts are useful to pay attention to. And, you'd have yet other agents that learn which of those to use in various

and see what the rest of ma-e is doing and say, "That's no g to work, turn it off."

What would such a machine do' MINSKY: it might be able to re-

chees and for designing transformers and reading oil well log, but if you switch one over to another application, you have to start from scratch again. What we need are administrative parts, which understand how to adapt specialists for other applications. It would be a

erring your structure into a se that won't break so ofter

transferring your discretes tools of comment it is possible, but it is created by the comment of the possible, but it is created by the comment of the comme

ways talk past each other. It seems that the view both the past each view land in he past the view of the land to the past that was been as the past that it was been as the past that it was th

smetter — where machines are or clushedy tools and separate? MINSKY: Or it could go a third way — where we regard them as our descendants. Issac Asimov ex-plained in a recent lecture at MIT

ould do. As they be puble, then it become of a problem ab

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expertise as a magician, but in escape artistry, he was the specialist.

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merged trunks wrapped in chains, but we can help you out of some difficult networking problems like no other data communications company can.

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a single vendor. Or tying into a vendor that may be better at computing than communications. Networking and

Weall know what Albert Einstein was famous for. and it wasn't his many rides around Princeton looking for his house.

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# The second Industrial Revolution

BY RAYMOND KURZWEIL

Hective treatments for cancer, eart disease, mental illness and their categories of disease. The in-rease in real per-capita wealth — 00% in the past 100 years — is specied to continue. But the potential for danger is so manifest. Today, we are rapid-turning over our engines of war intelligent machines. Their intel-gence may be as flawed as our war, Computer technology is al-eady a powerful ally of the totali-tries.



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### Mankind, computers and communications

BY KOJI KOBAYASHI Chairman, NEC Corp.

I named this relationship "man d C&C" and think that it is the

are to utilize C&C freely.

In 14 more years, we will enter
the 21st century. There are many
views on prospects in the 21st cer
tury. However, they all aim at the
realization of the advanced infor-

I have a dream: to realize automatic interpretation telephone systems through which anyone in any part of the world can convey his intentions beyond the difference in

languages.

ischnological Innovation has brought forth both economic and social change. What then still be the motive what then still be the motive of the still be stil

mation.

I take it that the movement to-ward GAC, in this wide sense, will be a central trend in electronics in central control of the control of the central control of the central control of the central confident that it will control set to evelop as we move toward the year 2000.

Pinally, I have a drease to real-phone systems through which any phone systems through which any convey his or her latestions freely, or the central central convey his or her latestions freely freeze in languages.

66 We can confidently post late more tactile and

NICHOLAS NEGROPONTE from "The Return of the Sunday Painter"

# Technology: Invader or protector of privacy?

# The high speed formula 3+3=2

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The legislation as written to protect

ed Technology for Communications Solu

through the network, usually wit out management direction or inte and often without management u

their homes, some vettheres and activities of the company of the c

of to resuscitate privacy protections.

Late laws in general are not do ing it, worker and consumer group are not able to do it, and management for the most part does no seem to be interested in doing it.

Many technical solutions to incoming the most part and administration of the most part and administration of the most part and administration of the most protection.

privacy protecsome of the informs-

negative pe mance impa user resista

ing environ-ments and lack of product robust-ness. It is time to rethink privacy It is also well to note that the

It is also well to note that the privacy issues involving computer data are nestled within a broader set of concerns involving employer and employees. This involves the corporation's desire for continually more informaton about employees. Consider, for example, current con-

Access to previous each and arrest records.
 The acquisition of is rom companies maintain uses on employee healt!

Wideo monitoring in restrooms and lounge areas to check for drug

use. In some situations, the justifica-tions for these are clear. Yet it is insportant to be aware that there is an expansionary trend to collecting and accessing personnel informa-tion. In a world filled with uncer-tainty, it is easy to assume that more data is always better. Prom a privacy, as well as an efficiency, perspective, that clearly is not the

some difficult questions face corporations when it comes to protecting privacy.

What should and should not be kept perhavior? There are few clear-cut standards that indicate what should be privacy-protected. Some organizations simply use a form of information cleastification (compa

monthly concerns gain instant attention today. Even with the weakness of the Privacy Act, there are legal ways to challenge privacy violations. Along with nexual har-rassment and civil rights violations, privacy violation cases se-medis level. violation cases general serest and can have se ons for corporate as well tual managerial reputa-

ties in ensuring privacy protec-ties? Many of these are data base issues having to do with data and egrity require straints must dels so that is

úsms put in a world filled with port their operauncertainty, it is easy

to assume that more data is always better. vacy issues will From a privacy, as well as an efficiency, n. One way to ink about. es is to clearly is not the case. op an orga-

nal priv cy pro ard. This will provide management with a review of how well privacy is beli understood and what more in re-

quired. There is increased public con-cern about individual privacy. Unlosts, women's groups and civil. Unlosts, women's groups and civil. Control of the seembly line and in the office of the seembly line and in the office of the control of the seembly line and in the office of the control of the contr

perspective, that

formation. This includes certain rights of corporations to be protected from their competitors. Protecting proprietary information is a leading example. Competitive business intelligence is a growing field, providing firms with tools and techniques to learn about their

rivals.

The second kind of data protection to be addressed is employee and customer and client privacy rights. From a corporate perspective, this may be considered a less pressing issue than corporate info

on protection. owever, a lack of att employee and customer and client privacy concerns may result in the loss of elsential business farto-public

Sheriarn is a Natick, Mass-seed information and compute curity consultant. Marz is an ng in the COMMENT

adiy program a runners of — from the unner to the

Computers have revolutionized almost all areas of our lives; it's exciting that com-puters are ac-

sorts of atheletes. As a runner, I intend to take advantage of computer training as s. I want to

ALBERTO SALAZAR

66 Computers now do most of the planning for our wars. It would seem only fair to let them do the fighting, too.

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on its screen. Your staff can even send on-screen memos with EZTalk. The EZTalk's screen can also tell you who's holding, who left messages and who needs to see you. So your most important client doesn't have to wait. You can call home immediately if you need to. And you don't have to put up with annoying buzzes and intercont interruptions.



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ents away: And VoiceWriter lets you add to recordings exactly where you want the additional text. When you dictate your addition, the sys it right where you want it by "mov-

ing over" all the text that follows. You don't have to worry about erasing the original recording. The VoiceWriter System has a console that tells you the status of each piece of dictation. So if you need a recording transcribed right away, it can be found right

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easier to use than other typewrit-ers, ft can correct anywhere on the page, two or twenty lines later. Storing what's been typed has never been easier, either View-Writter has its own memory and expandable storage. In fact, ViewWriter has all the

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# Government must back development

Supercomputer design is best done by small engineering teams uncluttered by bureaucracy



puters and variants such as



years after. The stational Security Agency (NSA) was a vital establish to supercomposter development in those days. A few of many computer firsts at NSA, all funded under cost-based contracts in the 40s and 50s, were the following:

2 Demon, the first practical use of magnetic

drums.

8 Atlas I, the first parallel electronic copputer with drum memory.

8 Atlas II, delivered by ERA in October 1963, with vastly enhanced I/O capabilities compared with Atlas I.

8 Lightaing, high-speed circuitry resear aimed at a 1,000-megacycle computer.

onal laborato-rtant. The or-re for the first

derate the state of the art in computers. Eckert and ly, ESA, CDC and Cray Re-

er risk and the ter profitability npany can ente e of national or

en a constant spur to the on of peripheral devices. use of the high cost of su-puters, the only reasonable the engineers, scientists and re-searchers who need to use them is by way of compatible, easy-to-use and reliable networks. This need, again, has been a constant spur to the evolution of network architec-

have been a catalyst for enhance-ments of the technology in both system and applications software Compilers such as Fortran and Pa cal are being enhanced to exploit sputer hardware architec bures, such as vector pro-

Preprocessor software is asso ap-cearing in the industry to help us-res gain greater benefits from their usisting codes when they are run an supercomputers. New algo-thms are being developed, and old

and correction and remote techni-cal assistance.

Nevertheless, the prestige and technology fellout motivations for a company to participate in the supercomputer market are proposi-tions too tenuous on which to bet the national survival and interna-tional competitiveness of the U.S.

#### Direct support

Direct government support is ecessary. It should take two orms. The first is funding for na-onal labe and universities to buy nd use supercomputers. This anding increases the size of the and use supercomputers. This funding increases the size of the market so that more competitors can stay in the game. Second, it helps enormously in developing beas technology within the nation all labs and universities and that technology can, in part, be the cat lyst for nop advances in supercomputers.

lyst for negt advances in supercomputers.

The funding available for national laboratories and universities to buy supercomputers declined seriously between 1970 and 1985. For example, during that time, CDC delivered 85 Cyber 7800 and Cyber 176 computer systems, not one of which was procured for a university in this country.

which was procured for a university in this country. In a constraint, we dedirected acrea shows a first of the country. In constraint, we desire the country. In constraint, we desire the country. In constraint, we can be seen as the country of th

as uncerunated, and other unity researchers were unablike advantage of their researchefits because of lack of functional procuments has finally recognized its their statements of the U.S. govern the continuation of the U.S. in supercating. The National Science P.

puting. The National Science Poun-dation decision, prompted by the Lax Report to resume its policy of providing grants for supercomput-ing support at U.S. universities, is beginning to prove very beneficial-port is for the government to as-sume more of the funding risk for supercomputer devideopenent and the advanced technology on which it relies, particularly in the area of component research. Industrial co-component research. Industrial co-



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operative enterprises, such as the Microelec-tronics and Computer Technology Corp. and Semiconductor Research Corp., can bear some of that advanced technology burden but not

that defined dechoingly include but and the condition of the product development in best of the product development in best diene by main engineering but the condition of the c

The government is also less vulnerable to the accusation of providing unfair competitive advantage to the small company than would be the case if the same contract were awarded to an established competitor.

Direct swarm

Direct government R&D funding of comcial supercom-ers beyond basic anced technology in the area of applica-tions. Learning to fully use the power of new

use the power of new architectures is a pain-fully alow process. But if the ware more di-rectly sponsored government work in universities and laboratories as a means of better applying these machines to important clauses of problems.

ements would in subversible and alberoarder important classes of problems. In a production of the property of the problems of

#### ert of computer set

xpensive communications, based on the technology, will be at the heart of high te new computer networks that are con y transparent to computers of different

igins. Application software, nce of artificially intel

the computer will become pro and more integrated as future increasingly, to become artico

stingly, to become arrows.

But above all, progress in artiful site will be the key to the full integranguter with its human partners artiful on known to the state of the sta late in human lar dy, by concentrati tion — the machin g on kn

Aiready, oy concentrating on knownedge rep-sentation — the machine counterpart to hu-nan memory — researchers are delivering prac-ical results, especially in the field of expert systems. Although machine intelligence, as Alan luring defined it, has not yet been achieved, mitted but commercially viable expert systems

Turing to commercianty viscous are beginning to emerge, are beginning to emerge. Relatively little has been achieved so far in machine vision — not because there has been little research, but because the obstacles are inamense. While assembly-line robots now have some ability to discorn shapes, the problem of the obstacles in the obstacles are inamented basen discrimination from machines in the obstacles are also as the obstacles are reasoning and the obstacles are reasonin Bilds remembers to the state of the state of

mestic appliances to-day. It is probable that By the end of this century, the expert systems that truly rival the capabilarchitectural improvements

over the next one or two ities of the human exet in a wide variety decades may be of fields will be avail-able in the mid-1990s implementable in optics rather Expert systems will come prevalent in than electronics. e bot

> e is in ss must be perfor the possible, wh ormed m ous or repec

an involvement unpleasant, where rapid age is being experienced and where know e-intensive tasks are key.

other-intensive tasks are key. These the nature of officialism in our public actions. The the tenter of officialism in our public actions in the control of the control of

based education systems has already reached the point where computer-assisted instruction can provide high-quality educational experi-ences for all journageers. Similarly, the instruction management and student testing commonship.

ence for all youngetiers, and exceptions and an interest testing temperature of them systems, which include entity presist expert systems characteristic productions of the system and the

there, and expert systems in a wide variety fields will be available in the mid-90s. There are exciting days ahead in the design

#### HANDS-ON

Surgical robot performs bioosies

#### COMMENT

The next great ad-

Mars, will de logy. question is whether will be Soviets or Americans who less in the application of

HARRISON SCHMITT Apollo astronaut and former U.S. Senator

# Technology changes, but human nature stays the same

We can channel technology to our own needs, but we may be at the mercy of our own nature

BY JAMES MARTIN s we look at the next 40 years, there is one thing we can be reasonably sure about: Human nature will not change. Playwright William Shake-

speare described with great skill human nature as we ob-Sami numer in today. We have the same power struggles—greed, love, kindme jealousy, treachery—as in Shakespeare's day. It is a reasonable but that it will be the same 40 years from now.

akespeare's works in a quarter of a second and computers for artificial intelligence appl cations running 10,000 times faster than to-

day.
This technology has shattering long-term potential. New societal patterns are being forged in the crucible of bigh technology.
Technology is changing exponentially, not lin-

rry.

Sometimes it seems technology is moving so at that it is out of control. Soon it will be oving much faster. The era of artificial intel-jence has barely begun. Computers are being sed to design ever-better computers. The ex-



We must always recognize that we're not channel it to our own needs. However, we may be at the mercy of section human it it our own needs. However, we may be at the mercy of our own human nature. But what is the purpose of it ail? To boild There are a few brief periods in human societhat might be described as a golden age. What for golden age could we achieve if the world population is eight billion and machina results are ultra-tuteful periods.

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ate more work. Civil servants mul treascracy, destroying not only the asure, but other people's pleasure.

HANDS-ON

#### COMMENT

ntine and destructive machina-

tions.

A highly civilized society concentrates on the ultimate purpose of its labor and minimizes the drudgery needed to achieve the purpose. It refines as faily as it can the pleasures that civilization can

the pleasures that civilization can achieve.
Technology has an immensity method of the control o

goal. New technologies destined to dramatically change society have always taken us by surprise. There has always been a reluctance to anticipate or believe the implica-tions of powerful technology. The industrial revolution caused such a nental change in history that

When it becomes an end in itself. technology is pointless. We need to regard technology as a tool to achieving a greater goal.

It would be at New York makingsmith, when the property of the 2000 century, the early warnings of new technology should be property of the property of the 2000 century of the 2000 centur

The technical advances of the next 40 years will be much greater than those of the last 40. Our abili-ity to recode genes will improve with genetic engineering processes being controlled by computers. Computers themselves will use bio-ogical circuits. Our unlocking of substonic particles will be a billion

Martin is an internationally recognized author and lecturer on computer technology. His aptheory company, Knowledgmarer, Inc. in Ann Arbor, Nich, is building suffucer tools to implement his fully matter stock to the control of the

we will soon have a long-cream-molecule filter on fine and strong that many thousands of miles of it can be coiled up on a large drum, taken to geosynchronous orbit, at-tached to a space vehicle and strung across space. It will become more possible to shift everything that is dirty and dangerous to space and concentrate on making the earth into a beautiful place. An innearity for nociety today the earth into a beautiful place. An imperative for society today in that human potential must be developed as quickly as technological potential. In many cases, we are failing to do that. We must strive for a greatness in everything, but above all for greatness in extending the frontiers of mankind. COMMENT

Why the easiest, cheapest, and best way for you to master IMS data base processing in COBOL is to use this \$25 book

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MSS, Far I cours 355. It's designed for self-instruction, to the only other loves, in the control of the course o

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got more for every training uniter by-spend. What's more, this book is a 2-for-value because it serves as a reference long after training is over. I'm ster you'll find it's much easier to use for this purpose than the IBM manuals are.

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Modify one of your CICS programs so if processes an IMS data base instead of a standard file? (Chapter 13)

jects like secondary indexing and logical data bases: in depth, so you'll know how to program effectively for these features. It gives you het and character listings of DMS data bases with 4 common types of organization. These show you how organization. These show you how organization stored and accessed by you'll make the property of the common of the pro-ference of the property of the property of the pro-ference of the property of the pro-teed of the property of the property of the pro-ference of the property of the pro-teed of the property of the pro-ference of the pro-teed of the proteed of the pro-teed of the pro-teed of the proteed of the pro-teed of the proteed of the pro-teed of the proteed of the proteed of the pro-teed of the proteed of the proteed of the pro-teed of the proteed of the proteed of the proteed of the pro-teed of the proteed of the proteed of the proteed of the pro-teed of the proteed of the pro-teed of the proteed of the pro another.

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#### Supercomputers on the way to the CIA

BY WILLIAM CASEY Director, Central Intelligence Ag

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orkstation at his or her deal In the near future, CIA scie Il be able to call upon the p

66 Humanity has developed a great many badly conditioned reflexes. One is the idea that technology is something new, Ifthe vector to think of technology and where we began to be the inventors — as machinery of war or to exploit humanity. I find the inventor of war or to exploit humanity. I find the inventor characteristic construction of the condition of the

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## Computers and man fly high together

BY MARC GARNEAU

Some of our customers have been with us longer than have been in business.







# A portrait of the artist

BY ARNO PENZIAS

he artistic use of various forms of analog computing goes back to the early days of the 20th century. No single event can be identified as marking its beginning. Fortunately, the situation is much clearer in the case of modern digital

ly, the situation is much clean computers.

Which we now have at computer at legan in Department of the Computer of the Comput

films for 1976, one can find the baconic de-formation of the party, her film and video work has no marked or starts. The special control of the control of the computer of the control of the control of the computer of the control of the control of the probability and the control of the control of the probability and control of the control of the control of the probability and control of the probability and control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the control of the control of the control of the first control of the cont

tion of Maher's insight. The flowing realization of Maher's insight. The flowing form of the picture makes it totally unrecog-nizable as computer art. It looks as if it had been painted without computational interven-tion. This same environment was used to cre-ate the landscape featured on the cover of this

onment. I am free to create instead of ng track of where I am. I can now work

ping track of where I am. I can now work ultraneously with two- or three-dimensional ironments, geometric or free-flowing pes, creating and changing palettes more ily than opening and closing tubes of nas. I now control the computer — the upster does not control on or direct me." What is Lillian Schwartz doing for an en-

What is Lillian Schwartz doing for an en-ored 'She' is using the computer as an analytic tool, "Laking apart" great paintings to study "Laking apart" great paintings to study colors. The works of Maties and Ricatow were among the first to be studied in this way. She recently added Lionardo da Vinet to her list, with remarkable results. She has come up with were to the riddle of who served as the model of the Mona Lian. She is expected to reveal her findings shortly.

Penzias, vice-president of research at AT&T Bell Laboratories, is the author of a forthcom-ing book on the societal impact of compilers. In 1978, he was awarded the Nobel Prize in



## An extension of man's mind and brain

BY ROD CANION et. Comoso Comoster Com cake many others both inside and outside of the computer indus-try, sy life has certainly been touched by the forces set in smotio-when Entice was developed at the University of Pennsylvania some 40 years ago.

r that of all th ng the past 40 have been mo dution of the

eight and activity.

erstanding came to me
ite compared with a lot
our industry, I'm sure.

I would probably still be at Texas Instruments, Inc. or running a Mex-ican restaurant if I hadn't walked into a Radio Shack store one day in 1981 to kill some time and asked to see this Visicorp Visicale I had heard on much about

see this Visicory Visicale I had heard so much about. A young clerk gave me a short demonstration, and I was Immade abely over whelmed by its power and potential. More than just sav-ing considerable time in many as-pects of one's work, it could truly

and posteriors. More than just extract many process of each work, it could carry process of each work, it could carry process of each work, it could carry process of each work, and furnish and work of the county of the county

DOS.

IBM followed these key decisions with two others that proved to be important building blocks in the evolution of the PC standard. The PC's architecture was opened up to hardware and soft ware developers, and IBM chose to sell; through separate authorized dealers instead of its own sales force. Out of all these factors, I'm convinced that the decision to design strong the provinced that the decision to design key. The SIBS broke the dam of developers, and they correlativity used.

the PC issued the land 9686 are at the developer's part of century and developer's part of century and in the land of the land 28 per of the land

ticany distrems course for Con-part of the Conference of the Handsed in a philosophical issue for me. The uniqueness of the Handsed in a philosophical issue for me. The Handsed issue of the Handsed of the Handsed issue of the Handsed of the Handsed issue of the Handsed shalldes and knowledge had to be shallded and knowledge had to be shallded in the Handsed issue of the poter standard means that for the first time, a capability can be built upon. All vasced and improved experience and knowledge that were galaxied before. When welding that were galaxied before.

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DOMIN: Have you ever so a robot looks like inside? HELENA: No

DOMIN: All the worse, God ham't the least notion of modern engine

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V5 applies artificial intelligence to SQL query optimization. For example, few DBMSs can optimize the query "Select accounts 90-days overdue and accounts over \$10,000." But only ORACLE can optimize "Select accounts 90-days overdue or accounts over \$10,000." But only ORACLE can optimize "Select accounts 90-days overdue or accounts over \$10,000.

☐ REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA. Relational DBMSs have always dealt with logical sets of data. But they manipulated only one physical record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands of records at a time.

☐ REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER

RESOURCE USAGE.

V5 is 100% re-entrant shared code, and ORACLE's parallel-processing architecture fully exploits modern dyadic and quadratic processors from IBM, and other multi-processing computers such as those from DBC and Streams. So ORACLE uses all the MIPS in parallel-processor

☐ REASON #4: MULTI-TABLE
CLUSTERING OPTIMIZES IOINS.

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table* clustering—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transference.

☐ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

OPTIMIZES DATA AGGREGATION Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, taster than previously thought possible.

☐ REASON #6: EFFICIENT ROW LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.

Row-level locking and a read-consistency model optimizes ORACLE V5 transaction concurrency. For the first time, high transaction thruput is achieved by a fully relational DBMS.

#### THE ULTIMATE REASON

Oracle introduced the first relational DBMS and the first implementation of SQL back in 1979. Policy ONACLE is installed on thousands of mins and control of the property of t





OMPATIBILITY . PORTABILITY . CONNECTABILITY

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# Why the new Midframe comp

is small, requiring less space than an ordinary desk. It's not fussy about

It's like vintage champagne for the price of table wine.

Sperry is proud to present the 2200/200—the very first Midframe computer. It's small, inexpensive and easy to use, like a minicomputer. Yet it

It's small, inexpensive and easy to use, like a minicomputer. Yet it has all the power and functions of a mainframe.

a mainframe.

Perhaps the best way to describe it is "the best of both worlds."

And that's just why we thought it deserved a category of its own:

Suppose you are looking for a departmental or single-solution computer. A minicomputer would

be your natural choice.

But let us tell you why the Midframe would be a better choice.

Like a minicomputer, our Midframe temperature or humidity, so you can install it anywhere. You can do it yourself, too, by simply connecting a few plugs. It even plugs into a standard 220-volt outlet.



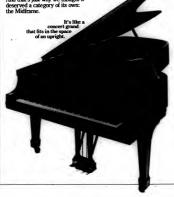
It's like a Concord

And like a minicomputer, the Midframe is easy to use. We've created a software package called SHIELD that lets just about anybody in your office use it, without extensive training.

What's more, it's priced like a minicomputer.

But to judge the Midframe by its performance, you'd swear you were looking at a mainframe. As a matter of fact, the Midframe is

> It's like a family car with the power of a race car.



# uter almost defies description.

powerful enough to serve as a host computer for most midsized companies.

In its most basic form, a single processor unit, the Midframe offers up to 6 Megawords (24 MB) of main storage, and more than a billion bytes of mass storage in the main cabinet. It can grow, as your computer needs do, into a four-processor system with 12 Megawords (48MB) of main

storage.
The Midframe offers enough capacity to support over 100 users range of time-tested OS 1100 software products to choose from. (Including MAPPER," the tool that lets you create your own appli-cations and maintain them—even if you've had no formal computer

The Midframe offers enormous connectivity, not only to Sperry computers, but to those made by IBM and others.

If you're wondering how the Midframe can be both a mainframe and a minicomputer at the same

time, there's a very simple answer. That answer lies in a new chip technology developed by Sperry, called CMOS III/VLSI. This lets us pack all the

processing power of a mainframe computer into six small chips, which can fit into the palm of your hand. It also lets us give you some features you've

never had before in any computer, micro, minicomputer or mainframe. Such as a complete duplicate set of chips to ensure full error containment.

If you're looking for a departmental computer, consider a Mid-frame. It offers you mainframe capability for about the same money as a minicomputer.

And if you are looking for a host system, the Midframe is a mainframe that can grow with you, at far less than you'd expect to pay. Would you like to know more

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about the Midframe?

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running different applications at the same time. Just like a mainframe. And it uses the same operating system that runs on Sperry's Series

1100 mainframes. That means you'll have a full



#### **COMPUTERS AND BUSINESS**

# 'Informational Man' struggles to control information society

BY AUGUST BEOUAL

he computer revolution encompasses a plethora of technologies - robotics, communications networks, electronic banking, software, computer electronics and other technologies at the cutting edge of modern scientific developments. Fueled by human intellect and manned by an army of technicians, engineers and scientists, the computer age has given rise to

the informational man.

IDE IN OTTIBALIODIAL IDLAID.

The computer's impact on acciety cannot be measured solely in terms of the number of men and women counceted with its production. While more than 20 million Americans are connected with heanufacturing, fewer than six million have any peripheral contact with the manufacture of the content of million have any peripheral contact with the computer industry. As for the 25 million jobs that will be needed by 1996, the computer industry will supply fewer than 10%. Numbers are poor indicators of the impact this industry has had and continues to have on our social and

Few will dispute that the computer revolu-tion has become the dominant driving force in the postindustrial society. Its long-term impact

the post-industrial society. Its long-term impact could turn out to be a least as important as a condition of the seast as important as a condition of the seast as important as a condition of the seast as a condition of the condition of the comment of the condition of the condition of the condition of the comment of the condition of the condit

to "revisia" "this have were word to the context of the compater revision.

In Washington, D.C., more the word of the compater revision of the compater revision of the compater revision of the word of the compater revision to city. Many went samply or flooded to the churches were compater to the compater revision of the

20 cent error in her account, the company's computers proved to be overgenerous—they credited her account for \$161 billion. The jumber of hardware—and software-related snafus grows daily. Some experts fear that in our rush to embrace the computer revolution, we may have neglected safety consider

ations. Computer errors, malfund ations. Computer errors, malfunctions and breakdown spoe a serious long-term problem that we have not a yest adequately addressed A study by the University of Minnesota Graduate School of Business Administration found that a majority of area corporations would be forced to shut down most, if not all, of their operations in the event of a serious

of their operations in use e-value.

In the case of a company with annual sales of more than \$200 million, the study found that projected losses for the first week of downtime to the first week of downtime to the first week of t Impore tians now my rejected ionese for the first week of downtime out of except \$80,000. by the second store to a for that \$80,000 by the second store to \$80,000 by the second store to \$80,000 by the second store to the secon

G. Weils were alive today, he would warn us of the dangers of computer dependency. Begardless of whether by error or develop-tion of the computer dependency. Begardless of whether by error or develop-ter fragile filter of our postcheductrial society. We would do well to resemble that the histories and Arnold Typrishe has analy of consented the analysis of the computer society of the computer society of the computer society of the computer society could easily join the "just year" of history. As Toyshee has observed, civilizations are frail social, golditical and economic edificies tacking the control of the computer society.

Compuser breaknowns and maximicitions are now daily occurrences in business and govern-ment. One bank executive confided that such an error may have cost his bank \$12 million. The U.S. General Accounting Office warns that computer breakdowns could result in both so-cial hause, and a serious loss of life. woc and a serious loss of life.

maifunction was not so lucky; Soviet jets inter-cepted it and shot it down.

Openations reported in 1970 that "computers make decisions that can clause incorrect actions for an extended period of time," and called on the fine. The promotion of the fine of t

ing.
in 1977, the Swedish Ministry of Defense known for its calm and collected manner, ad its voice to the chorus. One of its committees

lia voice to the chorus. One of its committees reported that the level of computer vulnerability in the West was unacceptably high, and warned that the West's growing dependence on awared that the West's growing dependence on specific—computer dependence has made the West extremely vulnerable to financial francia should be subjected to the computer of the computer



well as England's Scotland Yard, the Pederal Bureau of Investigation and the Paris-based Organization for Economic Cooperation and De-

lopment, have raised similar concerns. Terrorists have started to attack comput

Terrorial have started to stated computer contents, as well as neinconnumerate to detection, and the sentencement of the computer error or malfunction can cost and the computer error or malfunction can cost to the computer error or malfunction can content to the computer content conten

on, the speed and storage ca enputers make the timely de ction of errors and malfunct city of newer

uming and costly.

omputer-related catastrophe has befallen our ociety. But some would attribute this fact more to chance than to vision. Even the American Federation of Information Processing Socitiles, known for its conservation, has called for a serious study of the risks posed by our computer dependency. Although difficult to quantify, we would be ill-advised to entirely

ss informational cata The Spanish Conquistadores had little trou-e conquering the New World. They did it the conquering to new word. I ney ata it the sy way, by simply using the network of goor dis that their indian adversaries had con-ucted. Likewise, the electronic pathways of inputer networks make our society vulnerath internally and ext

Groups opposed to technology date back to the early days of the Industrial Revolution. Small but vocal groups opposed to our high tech revolution have likewise made themse tech revolution have likewise made themselve visible. One of the first of these was the Inter-national Society for the Abolition of Data Pro-ceasing, Simile groups have seprang up in West Processing, Statistic groups have seprang up in West his the control of the Processing of the Pro-groups as individuals who fear the new and unknown — timid soois, afraid of change. But this view underscores the fact that the high-tech revolution is regarded with appro-paration of the Processing of the Processing of the Pro-position by of the Processing of the Pro-position by of the Processing of the Pro-position of the Processing of the Pro-position of the Processing of the Pro-position of the Pro-

ety; many of these people are themselves men bers of the high-tech community. They fear that the electronic genie is fast taking control of our lives — that we may have glimpsed fora's secrets without fully und their ramifications. Our very privacy is at stake. The late U.S. Sen. Frank Church (D-ldaho) expressed his fears when he observed that there would be no place to hide in the sputer society. Computer snooping can tell a at deal about us. It can lead to serious

litical manipulation.

There is reason for concern, especially as ers increasingly take over our daily es. For example:

■ Computers perform more than 100,000 calculations each second for every man, woman and child in the U.S.

and chisk in the U.S.

8 Our names pop up in some computer at east 40 times a day.

8 Pederal, state and local governmental agencies keep more than 35 files on each one of six, while the U.S. Bureau of the Census collects note than five billion facts about us.

Privacy and civil liberties are with the third than the Privacy and covil liberties are without the other. But privacy is fast becoming a thing of the nest is not communic acceleration.

other. But privacy is fast seconding a thing of the past in our computer society.

B The NSA's computers eavesdrop 24 hour a day, seven days a week, on all overseas communications. NSA also occasionally moni-tors communications within the U.S.

communications, row within the U.S.

8 Much of the confidential data stored in the computer systems of financial institutions, retained as a manufacturers is valued to the confidential and the computer store in the computer store is valued to the computer store in the computer in the computer in the computer in the control our telephone system makes it very vulnerable to electronic

es can now keep track

snooping. B As computer systems are linked to nation
B As computer systems are linked to nation
control of the system of the sys one county. Our massive onto othiks and instant retrieval systems make George Orwell's telescreens seem ancient by comparison. All that is now missing is a giant network that would link all private and governmental computer systems into one. That, too, may be in the

offing.

William B. Finneran, a member of the New York State Commission on Cable Television, has said that "the technical capability for colecting large amounts of personal information is already Berel." And computer pioners of coseph Weizenbaum warns that we may be fast the computer for the computer process that the control of the computer pioners are considered to the computer pioners and the computer pioners are considered to the considered to on of sheep. Events may so

### COMMENT

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strial to a serv

1 bel setury will with sch convenience he ability to turn one's m way of s phone call or the means for a do-it-yourselfer who was once a mechanical misfit to true.

r. The pe PETER GRACE Chairman, W. R. Grace & Co.

Computerized incompetence: First Law — The computer may be incompetent itself — that is, it is un-ble to do regularly and accurately the work for which it was designed. Second Law — Even when competent itself, the computer wastly magnifies

he results of incompetence in its own ers and ope Third Law - The computer, like the

haman employee, is subject to the Principle. If it does good work fast, there is a strong tendency to promote it to more responsible tasks until it reaches its level of incompetence.

THOMAS MARTIN from Molice in Blunderland

prove both of them correc Today's limits are im-posed not by our integra-tions. For example, there are plans afoot to constru a computer that: a Talks and responds i many language. B is tuned to a person' hain waves.

ain waves. th to be B is small enough to be worn as a wristwatch, but yowerful enough to com-municate with other com-puters around the world. Also planned is a chip that can hold two billion

narvela, it reed dir

et al. (1997) and (199

by several weeks of a faulty compa

The damages

B A fire at the First

Data Corp. computer facility in Massachusetta resulted in more than \$3 million
in damages. More than \$30 of its time-sharing customers went without service
for more than a week.

B A faulty computer in

South Carolina was responsible for \$55 million in unaccountable annual state.

 The 1978 Santa Bar ske made 12 ms in

B A government ter may

the deal

th of at least one B An IBM survey of 352 ajor computer break-was found that fire and oding accounted for re than 60% of them; hu-

man error and bombings accounted for the others. The causes of compute malfunction recommend a ne causes of computer malfunction range from op-erator negligence to natural phenomena. Some experts believe that even electro-magnetic changes generat-ed by the human body can affect the

puters. A survey of 500 Car

an users found that more than 40% had experience some computer-relat problem in the prec The unrelia ability of

hardware and software is well documented. Yet both the American and Soviet the American and Soviet military are toying with the idea of a launch warn-ing system in which com-puters would be pro-grammed to launch a nuclear attack, on their own, if their sensors de-tected approaching mis-

alica.
Automation is fast dis-placing workers in the automotive and textile in-dustries. By the year 2000, manufacturing jobs will ac-count for only 11% of the labor force, down from nearty 24% in 1880. Agricultural jobs are also on the decline because of automa-

Robets in work force

Rebets in work force
By 1900, up to 1.5 million workers may lose their
jobs as 200,000 robots enter the work force. A new
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group:

In Coart stenographers
In many states are now being replaced by computerized tape recording systems
designed to keep track of
proceedings in several
courtrooms at once.

In A strike in 1983 by
675,000 ATAT employees
proved incifective, largely
because several thousand
supervisory personnel

because several thousand supervisory personnel were able to operate the telephone system with the aid of computers.

a Striking Consolidated Edison workers in New York were not able to shut off service to the company's 3.5 million customers, largely appearance was able to keep the system going with the assistance of the company's computers.

with the assistance of the company's computers. The industrial Revolu-tion was responsible for profound social upheaval and widespread civil strife in Europe. The streets of Paris, Rome and Vienna be-came hartiserounds. Em.



FAQS/XP\* has a solid track record as a leader in the field of system utilities. Since 1977, FAQS/XP has met the needs of 1800 DOS/VSE users. But if you are like the many who have turned to VM. ew champion in console and spool ment, FAQS/VM\*, is avail-FAQS/VM allows VM users to view arrent console activity and to execute

rator commands from individual sais. Past syst m activity can be yed on-line and srch ived to tape Also, system activity can be search/ selected by user-ID, time of occurrence, or string-literal matches, and users can review spool files with the VIEWSP facility. Finally, FAQS/VM provides complete extended color can highlight messages in diff

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high intensity, low intensity, or bit Why lose your momentum new? Stay ahead of the puck! Call Goal Systems today at 800-844-8446 for a free, no-bligation, 30-day trial. FAQS/VM; one more reason why Goal Systems is the

any to watch.

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- ployee acts of subotage became common.

  In the common substance of the common substances of admittacily to a leaser extent, its share of many employee substance and civil acts.

  I Argy employees in Creat British have

  I Argy employees in Creat British have

  I have been substanced by the common substance of the common

- sachusetts have threatened to destroy the wei-fare department's computers.

  B Disgruntled workers sabotaged the westh-ers service computers operated by the Metropoli-tan Life Insurance Corp.

  B Striking New York University employees threatened to destroy the school's \$3.5 million
- threatened to destroy the school's \$1.3 million computer center. Keeping in mind that many of our high-tech companies are small, the majority employing fewer than 200 people, the question often saked of our high-tech prophets is, "Where will the millions of displaced workers find new jobs?" As early as 1970, then British Prime Minister Zdward Heath warned that the long-term threat to the Wist came not from nuclear var, but from the workers are not from unclear var, but from
- civil strife.

cvis strike. Corporate snooping is not a new phenomenon Companies have always wanted to know the business plans and strategies of their competitors; corporate intelligence gathering, atthough unethical, is often out Hegal as long as the snooper doesn't resort to outright stealing. Computer technology has made corporate spying easy. It is simple to

buy information from one of the more than 2,000 of the more than 2,000 data retrieval services in the U.S. For example, a data base service called Investext, published by Business Research Corp., will provide a subscriber with the full text of a research report prepared by a security analyst on a competitor. Selective Dissemination of Information Companies of Corp., and the Companies of Corp. (Contraction Service).

Information Services, can give a subscriber an up-date on a competitor's data base. Economic lo-formation Systems, published by Control Bata. Corp., can provide a subscriber with the loca-tions of a competitor's planta, the oumber of people it employs, their estimated dollar volum output and their market share.

Themse-whites
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and an instructor company employer was Found unfort and employer of the California Department of
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(Intel, after or defect and, copy software, leaf,
confidential data and even use faster employers
confidential data and even use faster employers sing Management Association has called for a mmitment to ethical behavior."

But what exactly constit But what exactly constitutes proper computer ethics remains ambiguous. A survey of 100 cor-porations by the National Association of Ac-countants found that only 52% of those respond-ing said their companies had any guidelines at all dealing with the use of computers; only 22% provided their employees with any written exidelines.

norumes.

The Educational Fund for Individual Rights ports that more than 90% of the firms it has udied have no guidelines on what constitutes

proper use of computers by their employees. Slowly, both business and government are coming to realize that techno-ethics may need to be defined. It is dawning on management that an

coming in realize that techno-feltion may noted to be felted. It is destroined to management that an excellent of the felted is the destroined on management that an excellent in the control of the cont

purpose."

8 Company B prohibits its employees from misappropriating computer time but fails to deline what constitutes "misappropriation."

8 Company C allows its employees to take their computers home, provided they use the only for company-related business; if fails to specify what constitutes authorized company specify what constitutes authorized company

Dealton computers now give even, motivate Dealton computers to give even, motivate committee to voluntinous information on a motivate committee of individuals both inside and countie the organization. Ensuring that an employee does not abuse this power can other prove difficult; at could even constitute an invasion of privacy if, the county of the co

of computer use. While union officials look Companies have always wanted to know the business askance on electronic show the plans and strategies of their widespread preception that it's acceptable to competitors; corporate intele file ligence gathering, although nd electronic mail nee unethical, is often not illegal to be changed.
Like all myths, the
high-tech myth has its vision of a better society.

as long as the snooper doesn't resort to outright The proponents of auto-mation, through their adstealing.

matton, turnough their advertisements and public
relation firms, remind us
daily that computerizan will make us happier, rejuvenate our ailing
fustries, eradicate racial and class differton either into a teneration of matter. s, give rise to a generation of superchi allow us to work in the comfort of our

Some critics charge that, in fact, computers: tion has merely introduced a new form of ten-sion in our lives — techno-stress. Techno-stress is one of those buzzwords that merits watching. It refers to many of the health-related ills connected to working with computrelated lils connected to working with comput-ers — its existence has been confirmed by re-nearch. For example, the National Institute for Occupational Safety and Health has reported that some of the most strensful jobs today in-volve computers. A survey by the National As-sociation of Working Women found that female VIT operators suffer a disproportionale number of miscarriages, deaths of newborn infants, chil-dren born with defects and pressure deliver-

ies. A study of 26 computer centers both in the U.S. and Canada by the Data Entry Management Association found that computer operators and ciercial employees at the centers complianed of back pain, nervousness, faiting, neck and shoul-der pain, burning eyes, stomach pains, skin ranhes, swollen muscles or joints and eyestrain.

### Harmful doses of radioti

There is evidence that some of the existing erminals may emit harmful levels of radiation. terminals may emit harmful levels of radiation. But computer industry sources deny these claims; they dismiss the evidence as dubious. They charge that these studies were conducted by people and groups unfavorably disposed to the computer industry.

ng the other ills connected with comp o is the sense of isolation and loss of

### HANDS-ON

An efficient, but risky, assembly line

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Whenev. Comesh, father [Incident, Mich., or for the computer is seemedly piece.
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facturing equipment to de ema like degradations to ent to detect ions to runnis

se in an a e if on own, if one po s positioned to examine units on the car body, the wh

use 300 points on the car body, the whose use indied to an institust halt.

Bed Dayleyses who spot any problems can also bed that data into the plant wide communica-cess systems through hundreds of on-line ter-inals. This performance feedback system alserfaces with the memory bunk of electrical steepings of the communication of the commun

art uners passer.
Chrysler cases robote extensively in each of
the assembly plants for tasks that include welding, installation of roof panels and sealing of
windshields and rear windows. Computerized
equipment also performs other jobs, such as
applying alignment and torque to froot suspen-

mons.

Before Chrysler has finished, it will have revamped four other auto assembly plants as well as its power train and stamping plants. And even then, the process probably won't be fin-

One of our objectives," Duran says, "is to

"One of our objectives." Duran says, "is to enhance the process a little more each time we bring up another plans." The benefits of this investment and effort are, however, significant. "With the new equipment and mer systems." Duran says, "Chrysles is increasing machine up-time by 10%, robuting time through acceptance by unfair amounts and reducing tooling and other manufacturing expenses by at less 10%."

### COMMENT

control it produces in some work-ers. The use of computers to keep track of worker productivity track of worker productivity — how many breaks they take, the number of phone calls they make and how fast they type — merely aggravates such feelings. Even some industry sources will private

is a problem.

In 1982, IBM entered the infantrobot market with a one-armed programmable robot system that could
computgrammane rooot system that cound be connected to a personal comput-er. The Japanese have unveiled a robot that is capable of reading books to the blind. General Dynam-ics Corp. is constructing robots that can be programs

Endote have arrived. Guided by artificial intelligence, they will soon run factories and hospitals, mine the deep neas, explore space, perform recore missions, attend to agriculture, teach in our schools and tend to our over. Robotics, however, is still in its infancy. Up to now, Japan has been the leader in this stick, Japan has been the leader in this stick, Guermany and Sweden. As the Commany and Sweden. As the Commany and Sweden. As the Commany and Sweden.

Guided by artificial in-

telligence, robots will

soon run factories and

hospitals, mine the deep seas, explore

space, perform rescue

missions, attend to ag-

cows.

u.s. catching up fast. Our robot population is expected expected to reach 72,000 by 1988; experts forecast it will exceed 250,000 by 1993. But robotics also car-ries with it a hu-

ries with it a hu-man price tag — before the end of the century, one-third of America's work force may find itself replaced

itself replaced by robots. Robots are the shock troops of the Computer Age. Plans are on the drawing boards to develop an en-tire generation of sophisticated home robots that could become standard household fixtures by the end of this century. However, robots are more than

merely mechanical servants; they are the link between the computer and the world at large. They are and the worso at sarge. I ney are guided by a microcomputer that can be programmed to direct them to perform specific tasks. Once pro-grammed, they often need little hu

Dank side
But robotics also has its dark
side. When computer brains maifunction, disaster can ensue.

8 A malfunctioning computer as
the University of Florida's Conter
for Intellectual Machines and Bobots caused a robot to go beneric
and destroy valuable property.

8 In Japan, a malfunctioning robot killed one of the mechanics sent

to fix it
Experts predict that by the end
of this century, robots will possess
many human stributes. They will
be able to distinguish human
voices, medi smoke, taste food and,
armed with artificial intelligence,
even duplicate our innermost level
ingst. There is even talk in some
legal circles of enacting a bill of
rights for robots. The robots are

entists are looking even farther down the pike to a generation of test-table composters. The idea is not use genetic to turn molecules that our properties of the pike of the virconnent into powerful computer circuits — in other words, to re-place the hillions of molecules that we make up a silicon chip with a new make up a silicon chip with a new make up a silicon chip with the composters. The Japanese, quick to see connercial opportunity, are fast moving into this area.

### "Living" chips planned

'Living' object planead

'Plans are also on the drawing
board in the U.S. to construct living
computer chips. Researchers at the
National Institute of Realth have
building blocked or life, that can be
used to construct powerful living
computer chips. EMV Associates, a
high-tech research firm based in
Eckvillie. Md, plans to have a protokype of the mainte sad-based
powers. years.
These living chips would be

more than one billion times as powerful as their silicon counterparts. Visionaries als dream of im-planting living chips between ons in the brain, giving it the ability to computers.

riculture, teach in our schools and tend to our plans to turn brain cells into tiny computers and link them to at communications networks, hing the brain to communicate rain to communicate rs many thousands of

miles away.

Science fiction writers have pictured a future with colonies in sapeo, floating door in departed as a specific property of the property of the computer revolution — by ultra-computer revolution — by ultra-computer revolution — by ultra-computers but also with humans. But the Computer Age also raises disturbing jugal, moral and political turbing jugal, moral and political revolution.

Bequai is a Washington, D.C. based attorney. Excerpted from Techno-Crimes, copyright 1987, D.C. Heath and Co. Published b



The Fine Art of h

# Walter Wriston

# The information explosion and the global marketplace

alter Wriston created the world's leading international banking institution and revolutionized the global banking environment in his 17 years as chief executive officer of Citicorp. Though he retired as Citicorp chairman in 1984, Wriston still works out of the corporation's executive headquarters in New York. He is chairman of the President's Economic Advisory Board and director of the Council on Foreign Relations. Inc. In an interview with Compu-

terworld senior writer Michael Sullivan-Trainor, Wriston presents his views on the role computers play in the success of American business.

What are the major ways computer technology has changed the nature of basinesses WRISTON. The major thing it has done is create a global marketsjace by tying the world together through an electronic infrastructura. This is the first time in history that has happened. What that means in that America is a tig market, but it is only a subsection now of a global market, and the impact on business.

How does that affect American business-men, being part of a global marketpisco? WRISTON: It means, for example, that it's a matter of indifference now to an American

chief financial officer whether he raises his capital in New York or London or Hong Kong. He goes where the best deal is, and it can be done literally in hours where it used to take

done literally in hours where it used to take conscitions weake or moeths. Some continuous was on continuous was on continuous was on the continuous conti

from which they can call up information on sales and inventory or whatever, they don't have to go and ask their former boss about those things. So I would predict that many layers of management will be eliminated ove time by the information explosion.

is there a tendency now for bu-ruly too heavily on the use of con-information technology?

It unto early in the use of compara-tion of the comparation of the co

we're not going to go back there.

So I's gene way—
so this sethnology — It's a more
ion new?
WESSTON: Exactly. I believe that corporaions will over time appoint chief information
fifteers, but a we today have chef financial
fifteers. They may be one in the same person.
In the same person, the work of the same person,
is well see a marriage of competitive marker
what with internal MIS.

Japanese tend to lead on the manufacturing side. In the moving of the technology from the

Where would you rank the use of information schoology as a factor in Citicory's shifty to be empeditive? is it the most important factor? WRISTON: No. The most important factor is he quality of the people. That's the most important factor in any business. Informati in just a tool. The quality of the tool, its sharpness, its timeliness is very important. Whether the information is built by a fellow er it comes up on the screen, it a still a

orp's CEO, did you pu restment in data pro-



machines. We spent a great deal of money on it. We still are.

an I do. He has a better unde ket picture, for example. There's over a tion dollars every day that changes hand he New York markets, not counting the ock market. So understanding how to ac-unt for that, control it and keep track of it is early a technical problem.

Where is this technology taking us? WRISTON: What's going to happen is the interface between man and machine is going to get easier. What is laughingly called user endly software is going to evolve clearly to the spoken word, and there will be very

ch more simple ways to access, display and nipulate data than we now have.

WRISTON: We will have greatly ac more of the same. I think that expert systems and artificial intelligence will become more the norm. You'll see expert systems selling products on screens in bank lobbies. A person would go up to one of these schines and ask about a complex account d he can query: What is the interest on the slance, do I get checks free, can I invest it in balance, do I get enecks I ree, can I invest it in a tax free fund, can I fix it so my checks won't bounce, can I do brokerage transactions? Any-thing anybody wants to know, the machine will tell them.

Will the resistance to technology lesson secones easier to use? WRISTON: Sure. I watch my 8-year-old

WRISTON: Sure. I watch my 8-year-old grandson sitting in front of a Macintosh computer and it makes me feel a little inadequate. We're training a whole generation of people. My generation grew up with a pencil and a pad, and the next generation that a big argument whether hand-held computers were legal

s generation growing up now will think stely nothing at all about using a person-puter as a tool for all kinds of things.

# Quill-pen days vs. oh-so-easy word processing

BY RUSSELL BAKER

Still, one cannot hold off forers. My family had given up saddle and estirape for the automobile, hadn's lift Had given up the candle for the kerosene lamp. I, in fact, used the light bulb without the still of the candle of the services o

d cheese So I resisted, played the old fuddy-duddy progress hater wi urged to take the easy way and switch to processing words.

When former writers who had turned to processing words spoke of their marvelous new lives, it with ease they always emphasized.

So easy — the processing pro-smade life so easy (this was at they always said) — so infli-ely easier than writing. Only an of — and here I caught glances aught with meaning — only an ot would continue to suffer the

to shorten a tedious story, I ca-clated. Of course I had doubts. all those years I had worked at ing only because It felt so good in you stopped. If processing do was so easy, would there be incentive left to write? If year we mand?

ny incentive left to write?
Why are we moved to act against
ur best judgment? Because we fear
ubblic abuse and ridicule. Thus the
ubblic abuse and ridicule. Thus the
not not of the habit by abuse from
eith fantists, and the author
ratching away happily with his
one quill puts it aside for a typeriter because he fears the conmpt of the young phalanxes cryby heatation about processing
by heatation about processing
by heatation about processing
ords was being noticed by agere-

orus was being nonced by aggre-ve young persons who had pro-sisted words from their cradles and thought the spectacle of som-me writing was as quaint as a sur-child family. I hated being ords and - man alive! Talk a

much fun — listen, folks, I have just switched right here at the sta of this very paragraph you are reading — right there I switched from the old typewriter (talk abo on the old type writer (talk abor one-quill pen days!) to my word ocessor, which is now elicking ray so quietly and causing me so the effort that I don't think I'll er want to stop this sentence cause — well, why abould you ust to stop a mentance when because — well, why should you want to stop a nertence when you're really well assunched into the sectioner— and it's so easy just to keep her rolling and never stop going to have to start another sentence, right? — which means coming up with amother idea. What the great thing — really great thing — really and truly great thing is about processing distinct the sentence of the sen

doing, is that at the end, when yo are finally finished, with the pice terminated and concluded, not to say ended, done and thoroughly say ended, done and thoroughly completed to your own personal, idiosyncratic, individual, one-of-kind, distinctive taste, which is unique to you as a human person male or female, adult or child, re-gardless of race, creed or color at the end which I am now ap-proaching on account of exha-

available paper space the pro-ing has been so easy that I am feeling the least, slightest, sm recang the least, slightest, small or even somewhat minuscule sen tion of tired fatigue exhaustion, thus being trapped into the time-wasting thinking process, which just about does it this week, space wise, folks.

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# Could a PC ever work like a TV?

BY DAVID KAY nst, Kaypro Corp. Let's face it. The personal com-puter, as powerful and versatile as it in, has a long way to go before it's thought of as a member of the family. Greated, it is a highly use-ful tool on the destrops of U.S. business. For word processing, data analysis, there's nothing like it. Rat for all the promises, all the

adjusts, there a nonning unit-post for all the promises, all the sopia about computers changing ir lives, I am not convinced. For most people, the television, e automobile and even the VCR

play a much more prominent role in the daily routine. However, those the daily routine. However, those of us involved in the shaping of the industry's future are certainly looking to change that. We are busy working on critically important ideas for business and industry that should help fulfill some of the great expectations that were ex-

ame on the scene.
For example, anyone who has eard the standard PC's "music" nows it is to music what air fres ner spray is to the scent of a ross hese rudimentary beeps, squeak and trills are a reminder of just

and trills are a remander of just how far we have to go.

The computer has the potential to be as entertaining as the TV, as educational as the classroom and a easy to operate as the VCR — may be even more so. But it will take even more so. But it will take some work. And, as in the past, the same work. And, as in the past, the same work and as in the past, the same work and the past of the past of

buy one, take it nome or to the office, plug it in — and wait for it to do magic. Without software and some skill in running them, computers are not too exciting. We are working to-

too exciting. We are working to-ward more standard functions, such as quality sound, word pro-cessing and printing, networking and a whole lot more. In addition, of time fand the amount of reading, it takes to get comfortable with these boxes fall of promise. Certainly, all of us in the impor-tant and changing industry are working to perfect our products. In the products, and the pro-ton of computers. In the next five to 10 years, we will see an appreciable growth in

In the next five to 10 years, we will see an appreciable growth in expert systems — software programs capable of certain types of decision making. But this powerfu software makes some demands on computer hardware that the cur-

The computer has the potential to be as entertaining as the TV, as educational as the classroom and as

easy to operate as the VCR - maybe even more so.

creases in the speed of program execution will be needed to bring expert systems into the workplace. The computer has found its natural habitat in business. However, in the next decade, we all must with the expand the market. To do this may require rethinking the way we interact with the ma-

chians. In addition to better, more ergonomically logical keyboards, we are evaluating voice-activated systems, touch-screen salvancements insteraction. Computer controls may someday work like those of a TV or VCR. To change a program, you'd change the channel. With both computer hardware with both computer hardware between the channel with both computer hardware program, you'd change the channel. The computer hardware program with the computer hardware with the computer hardware program with the computer hardware with the com

yet it is only natural to pr

more. We need greater memory capacity, vastly improved software and more to begin to fulfill the promise of the computer age. To ask computers to be smart — to perform even the most eiementary of tasks, like telling the difference between a dog and a cat — is still more a challeage than a reality. But, conveniently, just as in the

challenge than a reality.

But, conveniently, just as in the ending of 2001: A Space Odgesey, we are in the driver's seat.

Through our imagination and our willingness to work out the bugs, the newspapers on the seat of the convenience.

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(MIS), dual IBM host communications, and ASCII Host Connect, delivers enhanced user access and flexibility to host data resources. Telex offers a wide selection of service plans. And. with over 2,000 service and

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# Learning to learn: Changing our schools

Today's demanding information age requires world-class educational system in the U.S.

BY DAVID KEARNS
Customa, Xens Copver the last decade, we've all
scen and read stories about
America's widening competitive gap—especially with the
Japanese. American industry
has worked hard to narrow

that gap, and we've made some pretty decent progress so far. But in the long run, none of it will do us any good If we don't narriow the education gap in our public schools. Indeed, most experts agree that the basic reason for Japan's extraordinary economic growth is its education

system. Japanese high school students have the Japanese high school students have the highest measured lige and the highest test scores. Ninety-five percent of them graduate with a high school diploma that is the equivation of two years of college in his country. There is no question that the Japanese have the second of the second of the second to the second of the second second the second suffer the most, because our schools are simply not turning out the kind of people we

The American work force is in grave jeopardy — and so is our economic survival. As a businessman and as a citizen, that alarms me it should alarm everybody else in this country, too. Every year, our high schools turn ou 700,000 functionally lillierate graduates; 700,000 more drop out every year. In 16 states, dropout rates range from 26% to 42%, with most big cities falling in the high end of



The failure of our schools to trach adequate busic skills is imposing enormous costs, and business is paying a big part of the bill.

American business will have to hire more than a million new workers a year who can't read, write or count. Teaching them how, and absorbing the lost productivity while they're learning, will cost industry 185 billion a year for as long as it takes — and nobody seems to know how long that will be.

Three out of four major corporations are already giving new workers basic reading, writing and arithmetic courses. Corporations spend \$210 billion a year on training— at Xerox, we'll spend \$210 million in [986, alone It's hard to believe, but adding \$25 billion a year for remedial training has become a necessary cost of doing business.

sary out of dough years, and the pile of remedial training, industry's training till will keep to the factory, is the center of our working lives. The backhone of the new American work force will be people who deal mainly with the formations and refinement of mainly with the formation and refinement of once every neven years. By 1990, three out of our jobs will require some decarding on trech-

four jobs will require some education or technical training after high school.

We'll need people who have learned how to learn. We'll need people who have learned how to learn. We'll need people who can shooth new ideas, people who can share those ideas easily with others. All of us will have to deal with more information faster, because it is the

more information raster, occasise it is the commodity that provides the competitive edge.

I'm a businessman, not an educator, but it seems to me that we have to rethink our

seems to me that we have to rethink our coloraction system from the ground up. The people who will run our companies and our proper proper to the proper proper to the 2000 are here today — in kindergurtens and grade echools and high schools. We should require the proper proper to grade exhools and high schools. We should require the proper proper to caking those childrens and once radically difrects ways of running the school step? re in. Business is often accused of having a myce vision that can't see beyond the next quarter, and TII admit that there's probably once truth to that. But this is one issue on

hich we're all going to have to take a longrm view. If we want to have sustained progress, we have to recognize that changes are no substitute for structural reforms. At Xerox, for example, we realized that we couldn't beat our Japanese competitors just by tinkering with our production methods. So, we revolutionized the way we do things. We restructured every-

thing — from the way we manufacture to the way we design, even to the way we think. We reorganised our entire organization to become more productive and more effective. I think our public schools have to do the same thing. Public education is the most hierarchical institution we have left in this coun-

same thing. Public education is the most hierarchical institution we have left in this country. Schools are still organized on the factory model, with students rolling along assembly lines. That worked when industry was organized the same way. But today, business is adopting learner structures and greater autonomy for workers, professionals and managers. Just as business had to reorganize to meet commettition, our schools will have to reorga-

mine to do the job society media them to do.
You can't build a world-class company on
You can't build a world-class company on
tumoded organizational structures. We've
learned that in American business. And you
can't build a world-class education system on
outmoded structures, either: But it seems
we've yet to learn that in American education

Why can't schools organize themselves the way the best high-ech companies do — with flat, lean structures that bring them closer to their customers and encourage creativity; and responsibility? Why not operate year-round, stay open beyond the hours of nine to three and teach a core curriculum of the skills our economy needs? Above all, why aren't schools demanding more from our children — more accountability?

The kinds of changes I'm talking about aren't going to happen overrught. Reform and reorganization are long-term goals that could take an entire generation to achieve, and I don't think we have that much time.

Business has the biggest and most efficient training system in the word already in place. We can continue to use it to help bridge the gap, but in the long run, I'm convinced that

we can continue to use it is overy at one that gap, but in the long run, I'm convinced that business cannot — and should not — provide basic education for its employees.

That task belongs to the schools, and we've

That task belongs to the schools, and we've got to help make them do it and do it right. We don't really have a choice, because the quality of our work force is a survival issue for

## Executive systems catch on the second time around

BY RICHARD CRANDALL

Executives' use of infor-ation systems will pro-tice the biggest payoff the imputer has yet offered the corporation.

to the corporation.

The computer industry
was built on the tactical
and production applications needed for day-to-

ons needed for day-to-ay business operations. While highly valuable in seir own rights, financial counting systems, pay-bil, production control and the like have done lit-te to answer the strategic uestions of the executive,

what are the profitabili-ty trends of the most re-cent products in the mar-ket? What is the pro for

Where are the five larg-est deviations from prod-uct quality goals and what is the forecast trend? With answers to ques-tions like these, executives using good judgment can save or earn millions of dollars for their company.

dottars for their company.
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after 20 years of refining

re is so much data the ecutive is drowning in corts. Executives ask for s, not more. They want formation that is rele-

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ROBERT ANDERSON

# Renaissance, revolution & MIS tyranny

Technical pioneers may regret it, but computing is out from the glass wall



# BY EDWARD ESBER JR.

And it has changed the lives of lions. The barriers have fallen; aparting is for the masses, and

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# Software is not keeping up with hardware

### BY GENE WHITE Chairman, Amelahi Cosp.

Obviously the single biggest impact of computers on society is the improvement of productivity and the hencefits we obtain in quality of life. Things are being made a lot ensire for our to do, whether is be shooping or running a business. It doesn't matter what the application might be; the end objective is for everyone to be able to

These applications are being driven by tremendous increase in computing powr. The queetion is, How much more capatility do we have to absorb the current mpact that computers have in the world?

Our current shortcoming in the indust is the lack of talented and qualified personnel who can take advantage of the power being made available to them. In addition, with the advent of more

in addition, with the advent or more sophisticated communications capability we're making the world a much smaller place. Using this capability combined wit compliters, we can provide nervices to pe ple that are far away from the source of

The application loads we are seeing today are continuing to grow at a pace that is substantially greater than in the late 1960s and early 70s. I don't see any slow down of that pace in terms of creativity is the marketplace. in the early and mid-1970s, with the frees of distributed processing, there as a theory that more of the rapability

or the user was. The fact is that with the cost of communications going down, it's very easy to delegate tasking to a subservient location from a large materians. But the need for a central control point and the management of a large data base will continue to require a large materialities.

companies implement distributed processing. They need more control, and they need to mannage and mannage and mantpulate more data. The economics are in fevor of having the appropriate combinations of distributed processing in conjunction with the large mainframes.

The extent to which we have improved the performance of computers through technology, although generally expected, has exceeded any of the expectations I ha

while at General Electric Co. GE's unique business anticipated distributed process ing somewhat. The company was also in strumental in starting time-sharing. Back then, we saw that form of application coming into the world and creating channels in the industry. If moretime and

invention of the microprocessor accelersted getting the intelligence out there in remote locations, and that certainly happened s lot faster than we hoped for back in the late '60s.

The crisis we will face in the industry in

one next. 10 years is not naruware, it is software. We can see great advances coming in the hardware world, and now what we need is a lot more efficient software that takes advantage of this hardware an makes that capability a lot more flexible i terms of how it is employed. The industry in general has lived with

The industry in general has lived wit operating syntiacs and systems softwar that have not seen the same rate of inprovement in efficiency and capability that hardware has seen. We all recognithat we must evolve from a systems software position to something that is a lot more efficient and productive. COMMENT

they to U.S. nonsmic.
growth and trade. In 1806
alone, the hardware and
resilvence production
reached 575, Miles, and employment ampeased a half
million people. U.S. computor expects were roughly \$14

Within the Commerce Department alone, we have perfectly a support of the commerce of the comme

had mare then for each products.

Permitteling the reveal tion in the rear of the o

time to the next off the cousey, their are of selects has special throughout the department. Personnel and projects electricistics, occurring electricistics, occurring electricists, turns unallysis, highturns unallysis, highturns unallysis, highturns unallysis, highturns their control of their meaning of international trains meaning or to a few electrolysis.

Reconsistes, trade anajijins and accreative of it
have access to sicrecomputers, embling them to reduce production bottlemeck
and increase their productivity. Microcomputers
have allowed the department to existe its clerical
attaff and free up production

of analysis.

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68 Thing's Information technology — from computty is stall technolom—did not their desired inent information rectary, it was already well inter may by the text 150s, Today's porphisticans activating only features are planty from the information period, that is desired by the The problem in the care planting, our estimates and consequently our decisions making here not cause to your the making of planty. — The final of planty method is no fundamental you a publish have no becaused in a fundamental you to publish have no.

JOHN MANIET

# Why the least expensive mainframe financial software may not be the best deal.



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Warner-Lambert and hundreds of other PORTUN 1000 companies who choose Data Design over other major vendors. Our customers know that it's important to ke

Other major venions.

Other cautioners linew that it is important to keep the purchase price in perspective. The cost of a ment frame by persis to experience the cost of a ment frame by persis to experience, 1) the cost of installation and conversion and 5) the cost of stall system operation and maintenance. Of these the cost demans, the first is by jet the smallest. Whate price of uniqueness \$5000 cost the purchase price of implementation and operations cost eventually add several handred thousand doubtes to the total? The trouble with chesp firmand is oftware in that you may never shop paying for it.

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# Information as a means to freedom

BY GERALD PROBST

ince 1972.

ng from them. I ays more than any computing in the sey are the ones

Creating the Netwo-ly, we are all giving to be surprised selver. The reason of the comprised selver. The reasons is that we are investing, developing and applying new lethnology of unposential not waiting for it.

This change is creating shock— This change is creating shock— This change is creating shock— this is the enemy of the obsoites, of contractive days of the obsoites, of contractive way of object in the courtring in the codal, political and common the contractive of the contractive of the sand economic resisting as well as in goods. For the most part, that \*\*

mons mat a lot of the world's lead-ers see as threatening. Many of them identify the status quo with stability. Many of them value stability more than progress. They react often irrationally and unpredictably. That means that we face unpredictable variables in ap-plying tomorrow's technology to-

ay.

Since we are the ones who let he computer genie out of the both, we bear an extra burden in eliping the world around us to unerstand and to cope rationally with the effects of the transforms ion. It has become a cliche, for metanon, to support the transforming America. But it's transforming America. But it's

is transferring America. But it is a transferring America. The it is far fact, I had be that instanent is for further. I say the computer is not further. I say the computer is not further. I say the computer is not for the instance in the instance is not in the instance in the instance in the instance is not for our real said has form we take the instance in the i

ney is, first and fore nic information. Inf new capital. It is

HARRIS

As the electronic world of money Illustrates, openness works. Conversely, closed societies are the victims of their own restrictions. Instead of applying to-morrow's technology oday, they apply ye terday's ideology.

and Japan. There are two basic reasons: The first, of course, is the we are cresting the technology. Be the second is that we are open

moving slowly toward openness. Obviously, the Chinese have a lo way to go. But as they harvest the

chnology today.

If they do, then all of us who lped pioneer the computer retion can take pride in the fact

Get the Courier HST 9600-bps modem. Then watch the rest of the world play catch-up.



# **Banners** waving o'er the industry battlefield

Lessons of deployment and mobility apply to competition in the technological theatre

BY ASHLEY GRAYSON hen a business sector enters a period of intense competition, the journalists and commentators liken it to a battlefield. The computer industry is currently undergoing such stress. so let's see how remarkably closely it parallels the history

of military adventures.
Lesses Me. I: There are no such to
military secrets. Once deployed, vir
technology can be reproduced by the
side. From the short-handled pitte to
chine gun, no nation has been able to



est at executing applications designed rive years previously. On rare occasions when territory fell to a we flag, the transfer of power was imple-ented by an army of occupation called the noversion team. Prequently outnumbering se data center staff by three or four to one, is division was garrisoned to speed the ac-prisance of the new order. During this tur-

otance of the new order. During this tur-di, several great houses fell from compete e pressure and internal confusion. Gener critic Co. 's Computer Divisions collapsed is a absorbed by Boney well. BCA Corp. ced interests to Orivare, which gradually inte add them. A most critical lesson was rend. 'Bule one in the book of computer med. 'Bule one in the book of computer of the president of the contract and re-ree drains routing by massive conversi-



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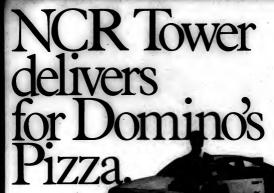
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During the growth of the mini kers into powerful and stable yers, many of the same scenari-of the previous period were re-yed on smaller scales. However re-were gone inspect and

ng revolution.

The fast turnover of goods and riviess enabled the mini makers to a much more effective than the sperpowers. Having lost the initiative to the upstarts, the superowers attempted to acquire a por-

tion of the new market through accusables and foreverle ground-bearing and the properties of the prope

sonal microcomputer, the battle be no again for local turf — the gan wars. The pride of inertitory found in the Apple and Epson America, Inc. QXIO series owners is deep an enduring. All but one of the power with the most expertise and re-sources to develop the new oppor-tunity ignored II.

The power of the power of the power with the most expertise and re-turning in the power of the power like power of the power of the thing power of the power of the thing power of the power of the real power of the power of the power of the real power of the power of the power of the real power of the power of the power of the real power of the power of the power of the real power of the power of the power of the real power of the power

tally miscalculated the micro.
DEC a appeal had been open architecture, low cost, accessible minire, low cost, accessible mini-uter products. In the micro, the company fielded an over-sered, excessively expensive m bound up in red tape. Other

id no better.

The single exception among the stablished vendors was ultra suerpower IBM. The design of the

pundable, accessible and positioned so that many smaller companies on the companies of the

ronment for investment. All ver-dors of compatible equipment can compete freely if the consumers are confident their investments in data, programs and training will be transferable should their current

transferable should their current while full. While Ital. While It

Dissident factions that once ap-plied their energies to creating bet-ter methods cannot attract capital to finance diversity.

to finance diversity.
However, computer technology, the be-way computer technology, the be-computer technology, the be-most and the second technology of the name that a machine profitably if only compatibility and price are required. Today, any band of loon-les with modern arms can hold up-wise, surpose with an overness source of components can hold a period of mostha.

The period of mosthal is a period of mosthal of the period of the computer market for a period of mosthal.

culture to replace the one they at-tack, and their aim is exploiting pricing vacuums for short-term profits.

profits.

Where is all this leading? One trend is clear. More and more computing power is being placed in the hands of the individual. But at the same time, are the thoughts that are thinkable becoming fewer? Yes

and no.
Pewer firms are designing "the best user interface," but more companies are offering improved interfaces for the IBM PC running Mr-crosoft Copy. Ms-Dox. Pewer different machines are seeking basic communications with each other, but more diverse telecommunitation of the companies of the

Grayson is the founder of ADi in San Pedro, Calif., a company specializing in developing docu-mentation and marketing moter als for high-technology firms.

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# Tools & keys: Unlocking information via networks

By JAMES THORNTON

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# **PC** hardware and software industries face future shock

Brand names will lose meaning as component standardization rules



What now? Certainly the micro-computer industry is maturing in that the hardware industry is not dominated by large and well-estab-ology and the micro-dential control of the control of the theory and even here, changes are not everything they seem to be. ——Standardization is and will re-Standardization in and will re-Standardization in and will re-Standardization in the will be com-trol of the microcomputer of micro-sory angement of the microcomputer industry. Nowhere has this be-come more evident than in hard-ware, where IBM established as

standaro row.

And yet, IBM is losing out within the very market the company created for its own Personal Computer. Every part of an IBM PC is now manufactured inexpensively and in a vast quantity from a variety of

front of the machine says, kn full well that the boxes are fil with standard parts anyway. Within the IBM-compatible

urers can survive only by remain-go on the cutting edge of novation, being the first to offer ch new advance in CPU perfor-ance and disk capacity. For manufacturers that are not the IBM-compatible market, the ture must be bleak. They do not

t of Apple Computer Corp. imately fall to IBM compa fter all, what school would



marketplace in terms of maturity. The final cost of characters is by no means in place yet, although some predictions can be made based on standardization and company pro-

The spreadsheet stan-set by Lotus Development Corp.'s 1-2-3, but no clear standard has yet emerged in any other part of the software industry. It will come. The market will also shift from a few bread-and-butter business

software companies do not have to foot the bill for development pro-jects that produce no product. They also pay the authors royalties from cash received, which certainly nding a project for a year efore the first sale can be

discovering.

I seriously doubt the largest software company will, in the future, be able to hold more than 5% of the market. It is probable that of the market. It is probable that senerge, jockey among themselves for market share with perhaps 200 companies in the second rank and 2,000 in the third.

Excluding my own company from comideration (for obvious strongest software companies to

strongest software companies to-day are Microsoft and Borland In-ternational. These are the two ional. These are the two cossessing the diversificat sucture most likely to prop nto the forefront in the fu-otus and Ashton-Tate are fully dependent on individu

By the end of the next decade, the computer will be an integral part of everyone's life. It already is

part of everyone's life. It already is for most people in the workplace. But among the major innova-tions in the coming decade, I expect to see a new class of heisure-time products that take full advantage of the computer's capabilities to generate whole new markets. What



# How new technologies change business

BY RON SCHNEIDERMAN



# Big companies dont always come in small packages.



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tions from those papers:

MAs a profession, information systems will rise to a peak before 1990 and will gradually decline as man-agers and individuals in other functions increase their information technol-

their information technology managerial skills.

Work at home will become a reality for one-quarter of the population of postindustrial societies by 1995.

by 1996.

8 The proportion of individuals using information technology in the
course of their daily work
will rise from 25% in 1995
to more than 75% in 1996
in Western and advanced
Asian societies.

8 Large organizations
will either develop a culturn that schoolings culturn that schoolings culturn that schoolings culturn that is the schoolings of the
accountry collaborate with or
country collaborate with or

tion or will be forced to acquire, collaborate with or be acquired by others.

If General business man-agers will be expected to attain proficiency in infor-mation technology by the year 1990.

mation technology by the Another expectation, or vision, is that end user per-ception will all from sys-ception will all from sys-a few individuals being used by misps to the expe-rience of many being avail-"Where information technology will differ from "Where information technology will differ from the construction of the intervention of the being will be made about whereas MIS systems tend to imply some boundary of ton available."

Moreover, the research-ers believe that industries will weave an electronic web that integrates the in-formation flow of multiple

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### Congress is conducting studies on everything from pregnancy risks among video display terminal users to the effectiveness of computer security within government agencies.

the flow and eliminating, or sharply reducing, the amount of redundant info

They expect that audi-tors and controllers will be slow to respond to the risks and exposures provided by the newly integrated information flows.

They anticipate standards for electronic documents will be adopted for most industries by 1990 and fully implemented by 1996. The electronic equivalent of administrative will be administrative will be administrative will be a secondary with the secondary of the secondary of the secondary will be a secondary of the secondary of th alent of a signature will be erally available and in-

tegrated into services by

One of the implications of these ideas floating back and forth between sponsors and researchers at MIT is that electronic integration of industries will, to a larger extent, replaacquisition as the mode of creating vertical organiza-tions that process raw ma-terial for sales of finished goods in either real prod-

octs or services.
Other research projects
examine different aspects

of the computer age.

If The Brookings Institute is studying investments in high technology markets, such as robotics.

■ The University of Ca
ifornia's Public Policy Research Organization in Ir-vine is exploring how



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In fact, the pace quick-ens with each session of Congress. Of the 400 laws passed by the 98th Con-gress, 58 were information technology related. gress, 56 were autechnology related.
The Office of Technology Assessment (OTA), an arm of Congress, has been the busiest, conduct-

ng studies on everything rom pregnancy risks mong VDT users to the ef-ectiveness of computer se-urity within government gencies. The latter is poor, agencies. The theory according to the OTA.

More recently, the OTA, in anticipation of legisla-

al information Dissemina-tion," an effort to docu-ment what technology manus in terms of the gov-ernment's potential to pro-vide information to the public and the possible im-pact of going from paper to electronic communication. Another new OTA project.

communications.

A close follower of all
this activity is John R. B.
Clement, director of governmental activities at the
American Federation of In-

formation Processing So-eties (AFIPS) in Reston, Va., who is conducting a number of studies for AFIPS, including an effor to determine where infor-mation policy is located in

This is no s

Clemen ple, th 17 sub U.S. Se

private industry.

This increasingly impotant insue concerns not only Clement but government employees who are

Schneiderman, who is based in Bedminster, N.J., has been covering the com-puter and electronics intries as a reporter a tor for more than 20

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# The evolution of automation and work

The information age impact on American workers and offices

arley Shaiken is professor of communications at the University of California in San Diego. He researches issues in information technology and the workplace. Computerworld senior writer Michael Sullivan-Trainor interviewed Shaiken on the impact of computer technology on

# American workers.

HAIKEN: There are two bro

The other question is the q ty of jobs that remain. How d automation affect the skills t

d in 1978. In 1986, the

## COMMENT

WILLIAM H. SULLIVAN JR.



78th Ave., Denver, CO 80225

# Is computer failing man or vice versa?

BY LILLIAN LYLES



hours, and it was quickly demon-strated that the monthly payroll could be generated for the entire staff in 45 minutes.

### Sabotaging the syste

As I washed for expected expressions of gratitude, I happened to look into the face of the payroll clerk — and quickly realized I had just made an enemy. During the next few months, I observed in any property of the payrons of the payrons of the payrons to as photostic.

amazement for tuen to story the system.

The final strow came when an illness on payroll day forced her immediate supervisor to get on the telephone with me and learn how the payroll by himself.

elephone with me and learn how run the payroll by himself, hich he did. This had a negative effect on the erk's career, since the supervisor cided he would rather spend an our or so doing it himself than adure a month of complaints.

Then there is the DP customer who makes unrealistle demands of either his DP staff or consultants, and quite frequently fails to acknowledge his computer system's

knowledge his computer system is true importance. One gentleman spoke bitterly about the costs and shortcomings of his system, but boasted to others that his system had saved him four times its purchase price is thwart-ed employee thefts during its first year of use.

Another customer who had mor an 20 years of vital history and rrent data managed on a \$5,000 crocomputer that had proven it

The foregoing examples illus-trate cases in which parties other than the DP professional were re-sponsible for compromising, or at

rtheless, the reader shou clude that I find no fault

on and alienation.

sualt may be for no better
than to protect the keys to
iom or the manager's sense

s generally the heart of a as and can determine the fi-thealth of a company, we watched several compe-ter and even die because of

There are thousands of mundane, boring activities that are still being done manually and that should have been automated long ago — not to do away with jobs but to help employees be happier and more productive.

upon their continuance, I do not feel kindity toward those of our profession who see themselves in a role other than the role of service to the property of the continuation of the continuation of the continuation of the operation who just somehow can't get the work done until it is too lists.

and inaccurate information are hard to pinpoint. Finally, there are thousands of mundane, boring activities that are still being done manually and that ago — not to do away with jobs but to help employees be happier and more productive. With the proper DP help, far fewer small businesses would fall. The micro industry has already

had an impact.

Peachtree Software, Inc., Bor-land International, Iric. and others have made outstanding contribu-tions, not only with the quality of

tner software but oy making it available at reasonable prices. With so many people still not trusting DF or using it as they could, we have a great opportunity to help those still entangled in the red tape of record keeping, looking for Mosey.

tyles is president of Data Con esson, Inc. in Chicago, an app ions, engineering and consul

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## Software: Science, art, tangible or intangible?

# BY MARTIN GOETZ

ata formats, report def-ons, screen formats d data tra

se way to think of a plex business applica is to treat it as a mation is to treat it as a ma-chine — as an assemblage of components that trans-mit information to one an-other in a predetermined way. Treating a business application as a machine means that it must be sys-tematically designed, built tested and maintained. Dis ciplines required for such "noftware machines" are similar to those for "hard-

ers and systemati-esigned and built in a form. Business orneering science that

requires trained person who follow strict disci-

The development of ne development of iness applications can rove significantly with the generation, higher il languages. These lan-ges can reduce the de-t, development, debugations by 20 complex appi to 1. They als NO CAR DEFT

tation of its business rules. And they allow for improved communication between the application developers and uners. By 1990, I believe that 90% of all new complex business applications will be progressment in fourth.

ed in fourth ation, higher level ages. These langua wolve over the next 20 years and will inc rate artificial intellig techniques to improv

ntenance and at costs will fall cally as these high-

While the program own toprocess is well-known to day, there is little agree-ment on the role of metho-ology software in information system plan-ning and in analysis and design of complex applict-tions. Many methodologie are partially automated and contribute to the sweare partially automated and contribute to the systematic definition, analysis and construction of business applications. But most companies de this work in a piecemeal fashion and usually from the bottom up, rather than from the top down. In future years, new methodology software tooks will help make soft-ware entities of the soft-ware entities of the soft-

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Plan for the futs

Pian for the future Corporations should be-gin to realize that well-de-signed and controved ap-plications are critical to their survival. Corporate competing in only begin-ning. In the future, radii-libe networked to share data processing looks. These networked systems will forent the basis for true cor-poratievide information weeks in conjunction with wideband communications yettems will allow applica-systems will allow applicas to be built that sha ons rather than cor-e overhead. And they id plan to build these

plex application 20 to 30 years. last 20 to 30 years.
Many of today's companies have up to 30 years of
experience developing complex applications. Many
now recognize the extensive shortcomings of Cobol.
Some have gone to higher

Some have gone to higher level language program generators that are preprocessors to Cobol.

Many others, however, now use fourth-generation, higher level languages that produce object code directly. These are the languages of the future. They will improve core the vester in vester in the second company of the future. we over the years in ctionality and perfor-nce. They have already wed their worth. Over

me these compiling sys-ms will produce more ef-cient code than that de-loped by Cobol-based mpuers. These trends will not only dramatically reduce

only dramatically reduce the cost of programming but will produce signifi-cantly more reliable pro-grams that require signifi-cantly less maintenance.

# Hit or miss? Secrets for creating top software

BY DANIEL BRICKLIN

In a relatively short pe-riod of time, we have seen the emergence of several distinct ages: the jet age, the atomic age, the elec-tronic age and the space age. Each has changed

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helped get PCs into bustness. I never heard users aspirat that they referred users aspirat that they be their productivity by 20%. Lotta III. 2-3 and the IBM Fernoual Computer vividing even more of the same type of improvement in a relatively upward-compatible way on a machine variety of the same type of improvement in a relatively upward-compatible way on a machine production of the same type of improvement in a relatively upward-compatible way on a machine production of the same type of the production of the same type of the

gram.

They made the previously diffi-cult task of formatting the input and output intentitive and trivial, and output intentitive and trivial, and of the input and in

### Falled to gain major foothold

Falled to gain major footbold invariably these products have failed to gain a major footbold in the marketplace because they don't provide a significant serving for the severage true without sacrificing the silvantages of the major spreadsheet programs. In today's market, we are seeing that desixtop publishing can pay for entire systems in just one or

two uses by cutting down on type setting fees and improving turn-around without requiring many

It is this type of payback, especially as the price of getting the output drops, that will make desk-top publishing a major user of PCs. Many of the areas in which you

can get such great improvement are those where you computerize a manual task. That is why we fremanual task. That is why we frequently see the first entry in a category that meets the users meet taking such a strong hold, usually only surpassed on new hardware or by products that are very upward-compatible. Computerizing a task airendy done well or similar hardware usually does not produce the large improvement [red are required, unless the cost of available in very, very low.

switching is very, very low.

As new hardware and software become available at lower and low-er prices, more and more tasks will be added to the computer's reper-Only if those tasks can be done

Only if those tasks can be done well enough by the computer that it would be foolish not to switch will they be added to the growing list of "major uses of computers." People who sell computerized solutions with multiyear paybacks will continue to miss out on the rush to acceptance typified by

Brickiin, president of Software Garden, Inc. in Newton, Mass., wa the co-creator of Visicalc, the first

COMMENT

PAOLO GUIDI President, Telenet Com ons Corp.

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raced the same data transfer challenges you do. Slow throughput. Labor-Intensive operation. Security problems. A growing number of companies have chosen Network DataMover® (NDM) from The

## Rethinking 'Automation'

### BY JOHN DIEBOLD

Then my book Automation was dashed in 1964, it was two years one the first computer was ever indied for commercial purposes, included for commercial purposes, included for commercial purposes, included for commercial purposes, included for the commercial purposes with the people had ever even in, were going to change the way tangers make decisions, communication and the commercial purposes.

business but the society in hich businesses operate? That was the central argument Automation. The difficulty lay getting people to look beyond the achine hardware. In 1962 the imputer was too big, too noisy, o expensive for practical use. One d to make a mental leap to un-reliand that the undertying tech-

can Airlines, which recently made a multi-billion-dollar investment in

purpose, as a result of tion technology.

section to extend the section of the section to extend the section at the beat as the beat section at the section of the secti

three phases of change: First you mechanize the work you did yester day. Second, you find that the work itself changes. Third, as a result of the first two changes, the greatest change of all occurs in so-

ciety.

By now we are well into the second and third phases of change. And yet, it seems to me that the really interesting developments have not yet started, or at least have yet to be fully recognized. Our current electronics revolution

It is natural that we to change.
That is what enables us to proclaim widely that there is a revolution and then to virshould find enterprises entering whole new lines of business, seeing fundamental changes tually ignore the complex economic, burn ness and social in their very mission or

issues that we must master before we can say we have ed with our revolution.

succeeded with our revolution.
The computer industry has
grown over the course of three decades into a major industry, but it
is now undergoing further shifts. It
is no longer a capital industry producing only capital goods. It has
also become a consumer-product industry, not only by way of direct

chips into wristwatches, toys and all manner of consumer durables and nondurables. What we are seeing is a techno-logy increasingly embedded into our economic infrastructure. At the same time, computer resources are becoming as crucial to economic

is.
The technology is tied to the reductivity of virtually all businesses and services, not just besure it affords the opportunity to malyze and rethink the jobs we do a individuals, as work groups and a basis certains to be.

as individuals, as work groups as large organizations.
This is where the really profound and subtle changes lie shees in the way we structure our work and our basinesses. Very few companies are using information technology to redesign jobs, to change information flows in the business.

In Automation, I described the rethinking process using the example of the New York Stock Exchange. It is not just a matter of adding gadgets to a centuries old process of selling wares, but using the technology to redirect the information "self".

## HERE ARE SOME FACTS THAT WILL NEVER CHANGE...

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ty and quantity of we do, we will be bet le to choose our own ty, employing new ology in ways that

### The social impacts

For the first time in his-tory, we have a technology capable of adjusting to hu-man needs, rather than the human being having to ad-just to the machine. As we learn to apply the bestefits of this extraordi-nary programmability of

nary programmability of computers, I believe we can 

nality of life.

Already the human/ma nine interface is become mpier and more natural, sabling the computer to recome a realistic tool for tople in the mainstream

## our society. By this I mean a to

hat brings us our daily cws, moves us more uickly through the super-tarket line, diagnoses our lnesses, delivers us the-ter tickets, gives us a di-

ater tickets, gives us a di-rect vote in government for runs and influences our leisure activities. No doubt robots will play a more direct role in our everyday lives, al-though, as I stated in Austomation, the human body is not the most practical form for a robot to take (in my book I used the term "Best," vices" as the serminedgy vices" as the serminedgy vices" as the serminedgy

It was the spectre of hu

te initial rear aton suspe-on of computers. When we arrive at the oint at which robots are heap enough and sophist sted enough to help the verage citizen with house rork and everyday chorer hey might initially resem he has demanded arms the automated arms at build cars on an asnbly line, or something re akin to a forklift than setallic android maid or

s MIT's

ered that every livster, with enormous ded in spiraling stra DNA.

So obviously biological storage density, speed and sophistication far beyond what is what is possible with to-day's chip technology. The convergence of computers and biotechnology will have formidable repercus-

Many years ago, Vann var Bush predicted that computers would be imnted in every one of us

tent, as microchips are em-bedded in heart pacemak-ers. And ansputees are benefiting from electronic devices that enable them to move artificial limbs by merely thinking. Electronic decessive replaces the hrn. circuitry replaces the broken nerve circuitry in the dy, so that the brain can send messages directly to the limb.

The possibility of com-puters based on biological structures will open even wider possibilities for in-

A tool in human has I would not discount th human-machine hybrids present. Will we use such powers to extend and am-plify human beings — or to diminish and control them?

diminish and control usess.

As with any new technol-ogy, it is no more than a tool in human hands. In-trinsically neither good not evil, the technology chal-lenges us to administer it wisely and fairly.

wisely and fairly.
One cause for optimism
is the fact that none of the
early dire predictions
about computers have been
borne out. At the time of
my book's writing, the stereotypical view held that id systems: centralized,

res ti

nation — the most impor-tant power we have. And what imagination will lead us to one can only begin to

and founder of The Diebo Group, Inc., a New York-He is the au

# When you don't have time to find the iob vou want

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So, if you're interested in finding a better data processing job, call one of our nearby offices. A few moments of your time now, may be the beginning of a new and brighter future.



## Remembering 'Automation'

B On the automated office. The primary function of the office is the handling of information. In the plant, the materials-han-dling problems are formidable ob-stacles to effective automation. In the office, materials handling is the

nee office, materials handling is the basis for use of the new technol-ogy. We may decive ourselves into thinking that the materials han-dled in the office are papers and cards, but actually the basic mate-rial being handled is information. Altibough existing communications

ute, accura and market analysis, a growing

dy of government regulations, mplex payroll deductions — al see are placing an increasing by n on office procedures. Although we have developed me extraordinary machines for nodling information, between 20 and 1950 there was a 53%

s, the

alysis pro-

What the new technology offers is an escape from designing in terms of the limitations of human operators. And it is only when we learn to organize our information-handling procedures to take full advantage of the treedom offered that we will receive the true benefits of computer technology.

Dualiness pronouns.

For example, as employee analyzing a sales record will use as tools a record of past sales, a work sheet or scratch pad and perhaps a desk calculator. All of these elents inch nts, including the human func-us of control and programming duplicated in the computer.

rical procedures have been d largely in terms of buma ons. Bumans can easily T Of ns of only a given magnitude th speed and accuracy. Useful ormation concerning business erations often calls for too great

operations often calls for too great an expenditure of human effort cannot be analyzed by humans quickly enough to be used. What the new technology offers is an escape from designing in terms of the limitations of human operators. And it is only when we learn to organize our information-handling procedures to take full advantage of the freedom offered by the new medium that we will

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res analysis that now ac-es installation of office nt. Procedures analysis re a substantial portion of

owever, what is required is ething similar to George Grang rown's "unit operations analyquestion to be assed is not, How can we handle these forms more efficiently? but rather, How do we use the information contained on these forms? Why is it gathered in this manner? How does it relate to other information we need for operation of the firm? In what ways

form?

To use the new technology as a speedier means of preparing the same reports that are now prepared and to treat their contents in the same way they are now track the same way they are now track would be a great mistake. What the we tooks offer is, in many cases, an entirely new way of handling business information.

On decision support systems if the output of the computer of the computer of

maintenance of the computer circuits is in a form authority of the computer circuits is in a form authority of the computer circuits in a form authority of the computer circuits in a form authority of the computer is being used far more effectively than 11 is employed to tabulate data that must be further coming useful to management. At the present time, much lower and middle management time is devoted to proceed in formation and drawing from may disk the significance with the computer circuits of the circuits of the circuits of the circuits of the circuits of the

uter can do mo lemma of wanting more informa-tion, yet not having time to use effectively what is already avail-



provide detailed, literally up-to-the-minute reports each morning. The results of using small TBM and and Benington Rand, inc. comput-sation of the state of the state of the statements and payrolis already indicate that such speedy prepara-tion is entirely possible. Pully integrated, automatic information-handling systems should substan-tially eliminate the present inabil-information in time to make needed decisions on an intelligent basis.

decisions on an intelligent basis. If you have a market curriar presents, in the fully notionated from the full notionated fr

unto between methods intomatively will be engined by the com-ly or continuous mentioning of the By continuous mentioning of the By continuous mentioning of the transport of the fact will take continuous or the fact will take contained or the fact correct (i.e. in form the matter states cave of the location of the large parts are spoiled by before many parts are spoiled by before the complete methods by before decision controls will be entitled to compute manufacturely with before spoiled by the parts of the control spoiled parts the complete manufacturely will be the complete manufacturely the control spoiled the control spoiled

By programming the machine with information now contained on with information now constained on parts lists, specification sheets, op-eration sheets and other forms used in production control, it is possible for the computer to deter-mine the optimum runs for each production line, taking into account such variables as the cycle time of individual machines, machine to the control of the control of certain components and the probability that delays will occur in specific zero.

of certain Chappensian and an approbability that delays will occur probability that delays will occur octul, parts lists and specification sheets are in the form of punched cards. These cards are processed by massers as the proposed by the card of the cards are processed by the card of the car

### To build a machine that will correct its own errors in accordance with criteria predetermined and built in by humans is very different from creating a machine that is human.

into the computer's programming. The enormousity complicated problems of the computer of the fact of the computer of the compu

mes are told, when coupled with animal-machine analogy of the mer school, surrounds the sle with an aura of reality. Even

Berkeley's Giant Bruins warns,
"There seems to be no kind of es-cape possible. It is necessary to grapple with the problem. How co we be safe against the threat of physical harm from robot ma-chines?"

physician arm from room. secu-tions are all the facts. The solution of mathematical problems an other feats performed by compel-tation of the security of the security of the human thought. But the resem-blance is too superficial to warms of the security of the security of the human thought. But the resem-blance is too superficial to warms or tare in any casential way human. The problem is lengthy one of yet developed the words that deal accurately with the new concepts of the security of the security of the security of what the machine is. In the Proad-est sense that we use the word "Chiller," it can safety be asserted.



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that we have no machine that thinks. What a computer does is to carry out a logical process that is not at all human. To call it thinking would be as incorrect as to say that a typewriter has human characteristic heavening it can "urito" this

The accounts that describe the new machines in human terms noglect one very important fact. Frewill, the essential human quality, is absent from all of these machines. In no way can this quality be attributed to any machine yet develpoed, nor is there my indication that any such machine could be decembed.

To build a machine that will correct its own errors in accordance with critoria predstarmined and built in by humans is very different from creating a machine that is human. Even if it were ucchnoisically possible to build machines that could perform all the work that is presently performed by humans and that had the shilliy to think — and even possessed free will — there is considerable ques-

tion, saide from all moral issues, whether we would economically want to produce such machines. From the standpoint of performing industrial tasks, humans are, in most cases, very inefficient. Oil refineries and automobile plants bear very little resistion to the structure very little resistion to the structure.

nmerce and automobile playts bearwey little relation to the structure or the function of a human beinglimman rebotts would thus replace humans in our present plant. But what a waste of investment this would be! For what a waste of human resources it is at present to have a human being, capable of all a human cent on and feel and exIf we possessed sufficient technological ability to develop humanlike robots, what a waste it would be to go about our industrial tasks in the way we perform them today. Bow much better to build machines that could perform these tasks without having the added ability to play games of chem, to walk, to solve difficult problems and to

## The next 40: Software innovation

BY JOHN DALAY

As corporations develop their one-range business plans, they vill be including detailed informaion strategies. These strategies rill revolutionize the way we do usiness today. And, they will be used not only on hardware, but or

Software of the 1990s will be streenely user-oriented. Systems of ware of today, for example, operating systems, data been managenest systems and eventually exerity systems and eventually exrest systems and erdificial incidingence, will need you have really limited to the system of the incidingence, will need you have really limited to the property or wrhal instructions as be inusined into the mainframe will secome an electronic library of cooriest data for access by manageoriest data for access by manage-

orate data for access by management, as well as for consolidation of final corporate figures. Applications will produce not only resultant information for the

end user, but will become predictive systems.

Sultes of systems called "whitecollar" software, for example, general ledger, accounts payable, accounts receivable and purchasing,

Software for all phases

These suites of software will be used in every phase of the corporation. Not only will there be white-collar software, but blue-collar software for shop floor control; open-collar software for shop floor control; open-collar software for computer-sized design; steel-collar software, including robotics of assembly and process control; and tast but not least, button-down-collar software or executive information systems,

management. This software of the 1990s will allow the management and worker to execute their functions so efficiently that the time necessary to perform their jobs will be reduced dramatically. Society will then have its four-day work week and each job function will be more challenging because repetitive, redundant and boving elements of business will now be performed by the

Software will be the drivin

As ease of use evolves out of rtificial intelligence, literally evy management employee will ave the opportunity to communite electronically all the business at a necessary for him to function. I will allow the computer to give only exceptional information, proding mission-critical solutions to or right manager at the right time.

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### BY BRUCE KULA

Does a decade of nested IFs evoke for you the slicate beauty of a mountain waterfall in late oring? Is there nothing in your life so satisfying tracing a storage chain through a 300-page

as freeding a secretary cream interrupt in acceptance of the Control of the Contr

The who was computered have to help here you love. Then mand by to paid to person every you love. Then mand by to paid to person every the computer of the manufacture of the computer of the

surprised that you seem to know a lot of per who know computers. You will have noticed, I think, that people

others may not understand them. Imagine you've come home after a hard day at work. You settle into your favorite chair with a glass of wine and a bask Sndfandy, a curup person explodes through the front door, ranting every bit as intelligibly as the foreman of the crew that built the Tower of Babel: Trace

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ict on J.

a shouts.
"Did you have a bad
y?" you ask.
"All I did was add one
tie transient to the SDL!"

on it's half your fi h, I know you've b pathetic, and some

People who nd compr

he same status as people who can't read

rstand, you should have seed a hand and said, fold it, Jack!" (or Jill, or ed or Sue, as the case ght be) — "What on rth are you talking

s possible you are les sed by people who bout computers than sed to be. You probsyou used to be. You bly have seen televis grams where the hero more often, villain) site front of a video display 

ve it or not, more com-ter literate than you ed to be. For example: Do u ever use the word "in-t" — as in "I'd like to put" — as in "I'd like to add my input to this dis-cussion"? Were you using that word in 1970? Proba-bly not. You have been ex-posed to the language of computers by the media and politicians and of the people you

ing arguments ding an article se. I haven't

have to dig ever y to design a comp

language all their own as the years go on, with more and more new and obscure terms. If you work with or live with someone in DP, both of you will have to work at understanding each other. And because the size of the DP lexicon is growing, it will be a neverrowing, it will be a ne-sding job.

Is it worth the trouble hat depends on wheth

Is it wo...
That depends on whenyou wish to communical
with people in DP or me
ly listen to them. The pr
wase of this article is to

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give you a running start at the former — and pre-sumes you are tired of the

er.

nawer A or B to the

owing question: The

puter is a useful device

sarily because of its (A)

d or (B) intelligence.

peed or (B) intelligence. If you answered B, or If you answered B, or were tempted even vaguely by It, it is possible you have been convinced by magazines, newspapers, films or television that computers have brains. Not

roots, only a very speedy electronic calculator. It has no innate intelligence, al-though some computers may be furnished with in-structions and information

tives point their fingers at them when the nummer is-sue of a magazine arrives in your mailbox just in time for Christmas. In novels and films, computers are

ch more likely to ur savings account es. A comp

anything. (In fact, a com-puter is too ignorant to make any mistake. It re-quires that a buman define the procedures it must fol-low to make a mistake.)

And lust, of course, is an emotion, which is some-thing a computer will never have. But about them tak-

have. But about them tak-ing over — there's some truth in that.

There may be computers skulking about your living room (in your television or stereo) or lurking in the

(in your nicrowave oven) or laying in wait somewhere under the hood of your car (a new car in like) to have half a dozen). Computers are pervading our world not because they are amarter than you and me, but because there are so many tasks a computer can do more quickty, dependably and efficiently than humans can.

puter can do more quickly con-ceptably and efficiently de-ceptably and efficiently and the con-lect tasks the problem Left tasks the problem Left tasks the problem Left tasks the problem defined to the con-ceptable tasks the con-det of the con-tent tasks the con-tent tasks the con-tent, altering or sharpening are tasks to consider the pin down in a second – the pin down in a second – the pin down in a second – the pin to adject two rulews, one controlling gasother, con controlling gasother, to the pin tasks the content to the pin tasks the pin tasks the controlling ta

has to change quickly and often.

Even if you could keep the valves adjusted property (which isn't likely), you'd be bored to tears with doing it long before you reached draundma's house. But a computer you reached greetly for as long as it had current flowing through it.

A computer will do, mindlessly, precisely what printlessly and perfectly for as long as it had current flowing through it.

A computer will do, mindlessly, precisely what it is told to do. Do not ac-cept the explanation "com-puter error" when your checking account has an overdraft for \$6 million. Tell the bank that program mers, keypunchers and computer operators make mistakes, but computers do

(I have to admit to one exception to this rule. It is possible for electrical or mechanical malfunctions to destroy or alter informa-tion stored in a communical tion stored in a computer. But a well-designed ma-chine will detect a proble like this and allow a hum to intervene and recover the lost information.)

A computer is a tool. So is a shovel. In two very

is a shovet. In two very different periods of our de-velopment, mankind in-vented them both. And there's nothing so very awesome about a shovel, is there?

Giossaries usually are at the end of a book, because a giossary is normally an optional reference — a handy place to look up an

unknown word. Unfortunately, it is vir-tually impossible to talk

# ck Across nutes Flat.

ed language ical a lan-rese might onsists of sh words

ial purpose. ommon word The most common word in conversations about consputers in data. It means information — and that's all you need to know. But all you need to know. But all you may be proceeding named doing to the proceeding the proceeding to the

is in ("I'm in DP") or a few other things. Strictly speaking, the word data is plural, mean-ing more than one datum. For example, your Social Security number is a datum hept on file by the internal Bevissue Bervice, and your more and address are among the other data that are bery. Unfortunstely, data has

are kept.
Unfortunately, data has
come to be used for both
plural and singular, so that
one is more likely to hear
the phrase "the data is cor-rect" than "the data are
correct." In lieu of the
word datum, phrases like
"piece of data" are in com-mon DP usage.

OP usage.
large computer is ofreferred to as a mainne or a CPU (central
seasing unit); smaller
puters are minis or mi. This discussion res primarily to large intes primarily to large computers, and a compet-er, as far as we'll be con-cerned, in a complex elec-tronic device that can be directed to process data rapidly and accurately. Ex-

cess depends on the particle. One application of computers is performing strike. One application of computers is performing strike and application of computers in the strike strike and application in the does to computer, added to, deleted from, added to, deleted from, added to, deleted from, and the strike strike are any number of ways in which the fractions may. But before a computer will accomplish any high computer and the performance of the strike in a landing the strike strike and applied times. The set of writing times the nottructions in a landing time of the strike strike and applied times. The set of writing time to the strike strike and the strike strike

would be written by of A common the control by of the common to the common th

oversaer of all other pro-prams. A job will not start until the operating system accertains it has the re-sources available to run it. An application program— like the one that prints paychecks — really sub-mits requests for resources to the operating system and does not use the re-sources directly. So the paycheck moversae will ap-paycheck moversae will ap-

ces directly. So the theck program will an-nee to the system it has eck to print, and the em will actually issue commands that initiate

A computer is not much more likely to lose your savings

account than it is to demonstrate a lust for blandes.

Notice that "system," with no qualification, usu-ally means operating sys-tem. The operating system designed by one large com-

designed by one large com-puter manufacturer is called the Master Control Program, or MCP, a name that sums up the concept of an operating system nearly. Programs are generally referred to as software, to distinguish them from handware. Elardware means actual, physical the computer isself. Software, as a rule, is what instructs handware. Elards

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tachment to a computer in some external storage device, which allows large amounts of data to be asswed and, in some cases, to be transported to some other computer or to a vault for aslekeeping. The storage in a computer in not sufficient for large mounts of data, as between the computer of the computer of other computers of contract of the computer in turned off electronic storage, it gets cleared out every time the computer is turned off. That kind of storage —

Completes in turned off. That liked of distings.— In a liked of distings and the liked of dark that must be saved, for the liked of dark that must be saved, for the liked of dark that must be saved, for the liked of dark that must be saved, for the liked of dark that must be saved on the laps. Dark of these contains an experience of the dark can be saved on the laps. The laps dark that must be laps dark that laps

old simply lift the tone-

arm and set it down at whatever song you wish. It works the same way with data: It is possible on a disk to access any datum almost immediately, without first accessing all the data that

Seems below it. Seems below it. When these is a stored on temperature of the seems of the seems

few cards. This is called submission.
It is not uncommon for all job submissions to be performed from a video display terminal, also called a VDT, a cathede my table (or CRT for short), a tube, a terminal a screen. The fact that there are so many synonym should suggest jub how common these thing

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Figure 20 operate.
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spere inc. and management can be seen and

are. Software is available to allow many functions on a CRT. Programmers may use CRTs to write and change programs and to submit jobs to tent the programs. Attrins ticket agents use them to find out what sectuare available on a particular flight. Botty most office of the programs of the programs of the programs of the programs. Attrins bottom to the programs of the programs and the programs are should be a program of the programs of the programs. At the programs of the prog

A special kind of CRT is ed to monitor and control e computer and the jobs nning on it. This is the

rinning on it. This is the consoler, and it usually can be found right next to the computer. The computer The computer The computer was the consoler uses the consoler system. On most system. On most system, or the system of the control of the consoler system, or the system of the computer, of the consoler system of the computer, doing a piece of this job, then a piece of this job than a piece of this job. The piece of the piece was the piece of this job than a piece of this job

It is rarely necessary for a programmer to have a detailed knowledge of how a computer works.

multiprocessing.

The ability to run jobs concurrently (which is not the same as simultaneously, remember) allows many ly, remember) allows many computer users to make use of the same computer. Two basic kinds of activities may go on: batch and os-like. A batch jeb docent' allow much human intervention, short of submitting it to the system. It requires a thorough explanation (to the system) about, what shall the job about, what shall the job and the programs will be executed and so on. This explanation

so on. This explanat tted in a special trel language (or

Job control language (or Job Control language (or Do-Blas or lateractive tasks are initiated by some one at a terminal. The in-formation the system re-quires, about data and piled to the system already. All the terminal operator needs to do is type in re-quests and wast replies, the terminal screen. In some contexts, the distinc-tion between batch and one to the context of A different kind of pro-gram is required for inter-

active tasks than for b tasks. Often a program will specialise in one of

other. Programmers, like any humans, do not all speak the same language. Some write programs in high-le el languages like Cobol, PL/L, Ada, Portran, Basic or Pascal. High-level meas "close to human language (althoush a Puria). (although a French Canadi an might vehemently dis-agree). In Cobol, for exam-ple, if one wishes to display the

dy rel the programs must be tran

upon the console, the co rect command is: "DIS-PLAY CURRENT-DATE UPON CONSOLE." Other program

This is a la used within the computer — than to English. Any of the programmer languages must be translated into maage before they

programmer does not per-form this translation by hand, of course; there is a program that does it for him, usually called a com-

Even once the program is translated to a series of digits that the computer will react to, there is no

will react to, there is no guarantee the program will work the way the program-mer intended. It may not work at all. A program that ian't working properly might produce 1,000 pages of gibberish instead of the

Year-Bad Profit Analysis Summary, or it may end abruptly before it has pro-duced anything at all. The case of the abnormal end (or aboud) is familiar

(or aboud) is familiar enough to programmers that many not-so-technicaterms are used to describe its Programs die, blow up, cancel and crash, not to mention blow away, crap out and take a dump.

Whether the program's coutput is had or nonexistent, the programmer mustart the process of debug.



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glag the program. As the word connotes, this means getting the bags out of a program, correcting the things that are wrong with it. If the program abended, the operating system makes have issued an error measure at the time of the abend that describes the

abend twas a problem.

If this is insufficient, the programmer may have to study a damp, A dump is a printed listing of part of the contents of computer the contents of computer that as it looked

when the program failed. This listing bears little re-semblance to the program as the programmer wrote it. It's just page after page ing of the mage of the con

the computer, unges used by rs were de-runderstood by t computers, so grammer has to orguage, it is seary for him to slied knowledge humans, not con while a program know his langua rarely necessary have a detailed of how

If you find the concepts discussed in this section difficult to grasp, don't feel back many DP profession-als have the same problem. Of course, there are plenty of people who find the con-

Of course, there are plenty of people who find the conopts childhahly simple, and loads of fun, too.

Most of this pricie is concerned with what are called mainframe computers. These are large computers, which unually are capable of supporting multiple uners, and which contain only the electronics.

necessary to process data—that is, any storage devices, terminals, card readers and so on are external to the computer; the computer; the computer; the condition sorbing more than a big metal box. Inside the mainframe are many circuits battle boards are received.

compact module shout the size of a stick of gass, its sense of a stick of gass, its sense of the stick of gass, stick of gass, its sense of the stick of gass, stick of gass, and the s

Commented to the year. It is possible to bey the microcomputer for a few microcomputer for the property of the



which suggests a tail. It can be pushed stream on any time to provide the pushed stream of the pushed stream of the competer acreem. On the screen night be a list of user would relie the mones around still an undersoone character on user would relie the mones around still as undersoone character on users with the sound still as undersoone character on users with the still as undersoone character on the program income a microtic had might display information about the person selected (By the way, by most users as a cursor). Sometimes pictures will be discrete instead of words. With a coreen instead of words. With a

Sometimes pictures will be dis-played on a microcomputer's acreen instead of words. With a system like this, the user might move the cursor to a picture of a printer, rather than typing in com-mands to initiate a print operation. It is becoming common to refer to these pictographs as icons.

these pictopiphe as loom. The transmission of the control of the c

head is only sack and forth across the jasper.

Crude graphics are possible with this type of printer, because it can be programssed to print dots anywhere on a page. Pictures composed of dots, like those printed in newspapers, are possible; however, simple bar chiarts, pie chasts and ial lettering are more com

applications.

For the printing of more sophis-ticated graphics, a plotter is used.

This is typically a very expensive and fairly large printer that prints with one or more fountain-pen-like

tith one or more rountain year vices moving over a stations sect of paper.

Word processing application sat demand letter-quality pri-ike a business letter, a resum (like a busi

a Journeau setter, a resume e-lance writter's manuscript,
itre a third kind of printer: a
ywheel printer. The daisyel, usually made of plastic, in
nted between a hammer and
a ribbon. It consists of many
res, and at the end of each. ic, is

spale is a raised character, exactly

The wheel spain years are specified by the print of the pr

micros and mainframes. Depart-ments of large companies and cor-porations have purchased micro-computers to help them do their

computers to help them do their work and use now discovering it, work and use to reduce the second of the second o

pent to call in to ter ev-

his Chicago office's computer every morning to get the current rates, which would be downloaded to his microscomputer. When he typed has not program in mind to the state of t

Eula is a software engineer for Paradyne Corp. in Largo, Fla. He now lives and writes on the shore of the Oulf of Mexico. This article originally was published in Com-puterworld on April 29, 1985.



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### HISTORY OF COMPUTING

# Mavericks, outlaws, dreamers & geniuses of the micro age

BY LAWRENCE MAGID or the most part, magazines and newspapers are chartered with the job of reporting history, not making it. But in the early 1970's, two hobbyist magazines, Radio Electronics and

Popular Electronics, were not content merely reporting on the changes in their fields. They decided to push things along. One of the first major events in the history of the microcom-

puter was the July 1973 issue of Radio Electronics that carried a cover story by Don Lancaster detailing plans for a "TV

COVET STOPY by Don Lancaster of typerviter." The article, according to micro power for Peterstein, served as a lightaining proposer. Level Peterstein, served as a lightaining and the light of the ligh

berts, the president of Micro Instrumen Telemetry Systems (MITS). MITS, so it id, was down on its luck. It had been in seemed, was down on its lack. It had been in the business of relining 990 calculators when Texas Instruments, lnc. and other semicondo-tor companies began flooding the market with cheaper and more sophisticated products. Rather than close up shop, floberts accepted that the seminary of the seminary of the semi-puter hit that could be sold for under 1500. Roberts would build his computer around In-tel's never and more powerful 8080 micro-processor. Solomon, who helped sketched out the as yet undesigned computer, promised to showcase the MITS alt on the cover of his

puter Electronics started a prairie fire. The tair, proclaimed as the "first minicomouta-to rival commercial

and data was rend via a pattern of red tas, Steve Dompier, an early MIT'S custome zied his colleagues at a meeting of Silicon leg's Bomerbew Computer Club when he nonstrated how the machine could make usic." Dompier positioned his Altair near a lo and relied on its radio frequency leaks to lo and relied on its radio frequency leaks to

By mid-April of 1975, MITS had re ore than 4,000 orders for the machi



















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STEVE JOBS

ercome. Its imper covery and deve stein was among d San Francisco g the few hun-

discovery and development." Poli-ved the Practice on minerature who case to meeting of the Rima-with case to meeting of the Rima-ter of the Practice of the Rima-ter of the Rimate of the Rima-ter of the Rimate of the Rimate of the Rimate was help, and the motivation, are de-corated to Polementa, "was defi-cient to the Rimate of the Rimate of the Rimate of the early limited was seen to the rimate of the production of the Rimate of the Rimate Indiana, which was introduced in 10.1, was the first first yearing of 10.7 percy, for under \$1,000, the rimate interpretation of the Rimate of the Rimate Indiana, which was introduced in 10.1, was the first first yearing the 10.7 percy, for under \$1,000, the interpretation of the Rimate of the Rimate Indiana, which was introduced in 10.1 percentage of the Rimate of the 10.1 percentage of the Rimate of the 10.1 percentage of the Rimate of the Rimate Indiana, which was also the Rimate of the Rimate Indiana, which was also the Rimate of the Rimate Indiana, which was also the Rimate of the Rimate Indiana, which was also the Rimate of the Rimate Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the Indiana, which was also the Rimate Indiana, which was also the I

s users. Jeorge Morrow, who later de-ned several computers of his n, was one of the first engineer lessign and market memory ords for the Altair. He distribut them by mall under the compa-name, "Morrow's Microstuff."

Morrow likens the early person al computer days to those of the wild west. "It was wide open.

Morrow likens the early personal computer ys to those of the wild west. "It was wide open. There were no restraints on what we ow that's not the case. There are tradiflons, there is momenturn and we live in a society that has its rules."

we did. Now that's not the case. These are traditions, there is now. The case of the case

rom a box of Captain Crunch al could generate tones that ld give him access to the phot pany's long-distance circuits. raper's legendary phone saking earned him lots of

tino, Calif. Steve Womiak (ale own as "The Woot") was so in-red by Draper's antice that he signed an electrosic version of ptain Crunch's whistle. Dubbed "blue box," Womiak's inven-

the brue boxes needed a marretin plan. To the rescue came Womiak good friend Steven John. As legen has it, they made a tidy profit, though the proceeds from this ac-tivity were nothing compared to what the two young me carned from their first legitimate enter-

puter processing at night. He also started sitzending Homebrew meet-ings which, according to the ac-counts in Paul Preiberger and Mi-chael Swater's colorful book, Pre-is she Falley, (Oaborne-McGraw-HII, 1984) had an encomous incom-on Wountak's life, During this time he learned be could purchase a 66002 chip for only \$30.

The Apple I

The Apple or His first case while a Basic programming language for the 6502. Units the 6502. Units the 6503. Units the 6503 is not crul, which a keyboard and a monitor inshowed off at a Homebrew meet-ing, was called the Apple I. A few months later, with the help and encouragement of Jobb, Wominak began work on the design of a more complete system that the pair even-omplete system that the pair even-omplete system that the pair even-

trailly marketed under the name, in accordance to the control of t

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on the destiny of Apple Computer, but also on its two main micro competitions, Radio Sanck Corp., and Commodors Business Machines. Inc. With Visicals, the Apple II such computers and therefore regarded by many as 10y, the Apple II began showing up on the deste of financial planners, managers and number crumbers in bouldnesses large and crumbers in bouldnesses large and fat own version of Visicale as did IBM, when it its induced its PC. its own version of Visicale as did BIM, when it introduced its PC. In 1983, Mitch Kapor, who had curiter worked for Bricklin and Frankston, helping create a Visi-cale companion program, intro-duced Visicale's first major compet-tor. Lotus Development Corp.'s 1-2-3 has topped the charts ever since and quickly replaced Visicale as the No. 1 selling business pro-

gram. Lotus eventually bought the rights to Visicale then stopped sell-ing it. Frankston works for Lotus, and Bricklin runs his own small software company, Software Gar-

den.

During the late 1970s and early 1980s, microcomputing was divided into two major and several minor camps. Most business users set-tied on machines based on the Intel 9080 or the compatible 230d, Inc. 20 CPU. These machines ran the possible of the CPU in the Intel 9080 or the compatible 230d, Inc. 20 CPU. They make the Intel 9080 or the compatible 230d, Inc. 20 CPU. They may be a proposed to the Intel 9080 or the CPU in the Intel 9080 or the Intel 9080 successful word processing pro-gram. CP/M machines could also run Dbase II, a serious data base management system, and Super-calc, a worthy Visicalc imitation. The rest of the world was using the Apple II, Radio Shack Model 1

164 21-321

or 2, and some relatively obscure machines such as the Commodore Pet. The Apple II, which could not display lower-case characters with out a third-party modification, be-

out a third-party modification, be-came popular among educators, game writers and hackers. CP/M was the province of business. CP/M had been around even longer than the commercial machines that

could run it.

Gary Kildall, a professor at the

Naval Postgraduate School in Mon-chery, Calif., wrote the predecessor

to CP/M under contract with inseldood processor. With the 8006 and
later 8000, Kildall refliered his operating system and enabled it to preating system and enabled its operating system of the system of the system

that computer a propri
than Ander Computer's propri-

ME. BOS 44

MS-DOS still dominates the may have to compete with hu dreds of cione makers, but Mi soft owns the operating system

One major personal computer mpany refuses to march in loc pp. Apple continues to market d expand its Apple II line. As cently as this fall, it announce ent with the Ar

For the business community, Ap-ple offers its Macintosh line. Intro-buced in 1984 as "the computer for he rest of us," the Macintosh was outed by its evangelistic inspirer, steven Jobs, as an appliance that, would bring computing power to

the masses. During the past two years, the Macintosh has found an important niche, at least for the time being, as the machine of choice for the exploding arens of desktop publishing. Desktop publishing may turn out to be the Vinicale of the 1980s. out to be the Visicale of the 1980s. Page-composition programs such as Aldus Corp.'s Pagemaker can trans-form a few thousand dollars worth of equipment into a typesetting, drawing and page-layout system, capable of replacing expensive equipment and services.

Apple will not dominate desktublishing for long. Already, seve are releasing deski untishing programs for the PC hile IBM readies its recently as sunced desktop published ounced desktop publishing bus ess unit. And there, as we contr late the near future, lies one of

ry: Energetic, sometimes ragged, young people and companies lay the groundwork and tinker with the possibilities. The boys with the ney and big production and diswings, ready to popularize, capital ize or, if necessary, imitate whatev

er seems to rise to the top.

It is hard to say if any of them will come up with tomorrow's history, but rest assured someone will.
Have you looked into your neigh-bor's garage lately?
Historical Postscript: If some of

this account seems like ancient histhis account seems like ancient his-tory, check your calendar. It's only just begun. Jimmy Carter was half-way through his term when Wos-niak and Jobs introduced the Apple II. The "good old days" of personal computing are still with us. Those of you who missed out can take heart. Sometime in the late 21st ry, when historians reflect or

rly history of the micro-sor, 1986 will seem awfully

Magid is vice-president and se-nior analyst in the San Jose, Calf, offer of The Sephold Group. He is a symdicated columnts for the Los Angles Times and a former con-tributing editor of PC World as well as the former editor of RC Magastine. He is also founder and former chairman of Snoot Hou, a

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# **Grace Hopper**

# First lady of programming

ear Adm. Grace Murray Hopper, the woman who learned to program the first large-scale digital computer - the mechanical Mark I - retired earlier this year from the Naval Data Automation Command. Hopper, 80, then accepted a position at Digital Equipment Corp. as a senior consultant.

She learned to program the Mark I at Harvard University in 1944 while on duty for the U.S. Navy and stayed on to program the Mark II and Mark III. She worked for the Eckert-Mauchly Computer Corp. developing the Univac I. She was instrumental in the development of Cobol and still serves on the Codasyl executive committee.

Hopper spoke with Computerworld Senior Editor Janet Fiderio.



poear OPPER: None at all. We didn't even know at transistors then. We didn't have mag-c storage. But Commander Alken — Ho-Hathaway Aiken — alwaya said he was

No one believed him? HOPPER: No, not at all. What I see now, after 40 years in the siness, is the Model T of computers. I think are just beginning. We've worked through

HOPPER: I have always loved gadgets, and I se anything that works. When I saw a Mark all I could think was that it was the biggest

You can always to be changed the the can always with the bechnology? HOPPER: No way. R was wartime. We had oblems to solve, so we didn't have any time think ahead. Incidentally, Commander Always on the can be carried to the carried by davelope.

rs haven't given us a fair

security or control? HOPPER: No, some people say that you can IOPPER: No, some people say that you can into a computer and access everyone's seds. But to get into a computer and find a sed, you have to know what you are doing, he old days, if you went in the file room, could pull anyone's file folder. It was all

ROPTER: It's hard to say because I don't we what's going to happen. I know for tance that in the next 10 years or so we will e computers driven by light instead of strictly. Optical technology is coming fast. It is difficult to tell when you don't know hai's going to happen. For instance, when I rst rode in an airpiane, a bipiane, back in 924, it was built out of lines, wire and wood rould no more have dreumt of a 747 than I

est proud of? HOPPER: All the young per ained. They are our future.



young people? HOPPER: I'd have them get in and learn

HUPPIER: I'd have them get in and learn wat computers as soon as possible. Many of m are already doing that. I watched a "d-grade class in Independence, Missouri, I those children were writing programs in it and debugging them. That gives me com-mee in the future of the country.

Hyen wore to go back, would you change ything in your career? BOPPER: No. I've been perfectly happy and we had a wonderful time. The Navy has en good to me. When I needed training, they we me training. When I needed an assign-ent, they gave me an assignment. Just think w locky I was to be able to work on the I'rat

HOFPER: Very much so. But I will fell you one thing. I taught for 13 years at Vassar; then I joined the Navy; next I was on inactive duty and worked for Univace before working for the Navy again. Now. If you asked me which is best for women, I'll tell you the Navy. There is less prejudice in the Navy than there was in the academic or business world. We get the rank and the same pay and the same

Do you have any recommendations for wor that have to work in the business or acade

HOPPER: Beat 'em. If it'a a good idea, go ahead and do it. It's much easier to apologize than it is to set permission

# By revolution and evolution, PCs grow into business

BY JONATHAN ROTENBERG

If the development of the computer industry over the past 60 years seims apectacular, then the coming of age of personal computers in the last 12 years in nothing abort of assaing, in this brief time personal computers have evolved from maddening kits that only a few large habbyists could understand into tearful tools that are resultanging the vary many businesses

In 1977, in the early days of Th Boston Computer Society, getting personal computer to stork, let alone to do anything more useful than play "Kill the Bet" on its front-panel toggie switches, was a compliabment to be celebrated.

at-panel toggie switches, was an suplishment to be celebrated. re were simply so many things could go wrong. If you didn't e at least one degree in engiring and a very steady soldering thand, you hadn't a prayer of ring a fully functioning PC.
Later that year, a rather radical
a came along. For the first time,
that you could buy, take home,
that you could buy, take home,
ilable. These so called "applicomputers"—the Commor PET, Apple II and Radio Shack
500— suddenly meant that

dore PET, Apple II and Radio Stac TRS-30 — suddenly meant that anyone could own a PC without being an electronics expert. Although it still wan't clear what you would do with such a composier, since there was very little software available, all at once the computer age had been brought down from its Ivory tower to a place where millions of nontechnical no-

ple could start to approach it.

The first real application software for personal computers—
word processors and data bases—
looked like badly lobotomized versions of mainframe programs.

Extres Jobs once company of this fact

soored sixe beauty lobotomized versions of mainframe programs. Slaver Jobs once compared this fact to the introduction of television in the 1850s. The very first TV shows to looked like radio programs with pictures added. It was quite a few years, Jobs pointed out, before producers began to see TV as an inherently different medium from radio and to take advantage of its unique potential.

### Liberating petrolisi

In the PC industry, it took just two years to liberate the medium's visited. This was not to liberate the medium's visited. This was the first commercial software package to truly exploit the ear was finding of personal computers. Taking advantage of the PC, visicalle was a new kind of personal tool for financial calculations. It was fast and easy, and it may be a concept that would have been too expensive, to different small instantly—a econopy that would have been too expensive, to difficult and too impractical to human distributions.

Most of the PC developments have, since 1890, been of an evolutionary, rather than revolutionary, nature. Tet they've been remarkable nonetheless. Personal computers have grown far more reliable, equipment costs have plummeted and many techniques have been developed to make complete tasks relatively easy for new users.

Although users today are mick

answer select for new sacers, question to estimate any selection of the certificial mannifecturers, not estimate of the certificial mannifecturers and especially software composite, for their inconsistence customer rapp selection of their inconsistence customer rapp satisfacts these compations have made in a very short person of time. Such computer software was noted in plantic manufacts being with a few computer software was noted in plantic manufacts being with a few computer software was noted in plantic manufacts being with a few computers of the computer software was not of the could not be transfer to the plantic manufacts of the country of the country

### December automatic

proud about in the extraordinary accomplishments of the PC industry in the last 12 years, there are still some major challenges ahead. In business, personal computer

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1-800-2-DEMO-VM, ext. 100 In Virginia, call (703) 685-1514, ext. 100 © 1986 VM Systems Group. Inc. ial. As personal productivity tools hat can help individuals write, bian, organise and communicate, Ca have been a big success. But as utomation tools that actually run bestiese — its order entry, inventory or accounting, for example—personal computers have personal computers have

achieved only marginal acceptance Especially for small businesses that don't have extensive in-house data processing talent, it's still too difficult and precarious to automate operations with a PC.

From a business perspective, automation applications are entirely different from productivity applications. Consider what happens, for example, when a disk is damaged or a file is garbled. With productivity applications, a user may experience several hours of frus-

a company may have to shut down until the problem is fixed. Another major challenge is keeping personal computers easy to use It seems as if every time the indutry takes a stee proward in making computers easier to use, it takes two steps backward in making them more complicated. As the industry responds to user demands for more convenience features, like deek accessories, windows, graph-

ee to make sure the features don't strangle each other. And certain technologies, like local-area networks, are just too complicated for an average human beling to deal with When the industry can figure out how to make a local-

use as the telephone — you just plug it in and it works — then this technology will be practical. The final challenge for the industry is to ensure that as it matures, it doesn't lose its pioneering spirit of innovation. This is a tall

it's crucial to keep the technolog vibrant.
The challenges for the person computer industry are substants But considering what has happened in the last 12 years, it is

Rotenberg is founder and president of The Boston Computer Society, the world's largest association of personal computer users.

46 I have no belief in the idea of a computer being able to replace a man. I normally give credibility to very advanced thinking. Who know? Who would have thought 200 years ago that we'd be flying around in the air? But as far as computers taking over the world, that's popprocok.

THOMAS J. WATSON JR. ormer Chairman and CEO of IBM

# Information society and the Control Revolution

BY JAMES BENIGER

After 40 years, Eniac seems securely established as an ioon in the history of companing. If we view compating as only one of several major developments in the ensegence of our modern information society, line-were, Enice appears actively. This to present the beginning. This torouter interests ever perspective, helieve, will better serve us in understanding where the continuing development of aircroprocessing and computing technology—used of the information

take us.
Twenty years before the first tube glowed in Eniac, America's top four information processing companies, with total revenues i 1928 dollars exceeding \$150 million, were Remington Rand, Inc.

of today's top
The compute four disting information and 1890 — writer, the cring adder of and Herman is tabulating equilook here, to

and 1880s — the Remington typewriter, the cash register, the printing adder of William Burroughs and Herwan Bollerith's punch-cart tabulating equipment. We must look here, to the technological and economic innevations of the period from 1870to 1800 — and not to Paiac and other developments of the 1840s — to find the truly revotationary origins of the Informa-

trial world has become an infortion society has become a cliche in not only the U.S. but also Canada, Western Europe and Japan, the bulk of the labor fornow works primarily at informational tasks such as extreme.



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alysis and computer program-ng, while wealth comes increas-by from informational goods ch as microprocessors and from formational services such as data

Informational services much a situ and before the control of the great sciental result of results of the great sciental results of the great scientar sci

al products, compa

Here, as in at least a dozen other countries. the processing of information continues to overshadow the processing of matter and energy.

with fewer than 30% from othe services, 20% from other indust and scarcely 2% from agricultur. The manufacture of noninformational goods, the so-called "most stack" industries, once the back ck" industries, once the base of the American economy nploy fewer than 15% of an workers by the end of

American workers by the end of this decade, even a farm work tall but disappears. Here, as in at least covershed to the decade of the decade of the decade of the covershed of information continues to overshadous the processing of mathematical or things that human beings value, why labeled be information, employed the decade of things that human beings value, why labeled be information to the decade of things that have not been a substantial of the decade of th

Answers lie in what I call the Control Revolution, a concentrati of abrupt changes in the techno-logical and economic arrangemen by which information is collected, stored, processed and communicated, and through which formal or programmed decisions might effect societal control. From its origins in control of the by which information is co

other technological developments.

To glimpse the future course of this change, the technological

counterpart to the transformation of the American labor force, it might be useful to reflect on its initial custe. The Control Revolution began as a response to rapid industrialization after 1830 and to the resulting crisis in control of the

the resulting crisis in control of the material economy.

Before the application of steam power, even the largest and most.

It is a summary power, the steam of the steam of

resucratic structures.

By far the greatest impact of industrialization, from the persp tive of societal control, was to

my, the system for the extraction, processing and distribution of con modities from environmental input

Alt ight, with the har cannot overtages, with the har-nessing of sissem power, material flows could move 10 to 100 times faster, day and night, and in virtu-ally any weather. This speed brought widespread hreakdowns in control — fatal train wysels, mis-placement of freight cur, loss of shipments and the inability to maintain high raise of inventory

turnover.

What began as a crisis of safety
on the railroads in the early 1840s
spread to distribution, or commission trading and wholesaling, by
the 1880s, to products, or rail milis
and other metal-making and metalworking industries, in the late
1860s and finally to the marketing

cessing industries — flour, soap, cigarettes, matches, canned goods and photographe film — in the early 1880s. Even the word revolution seems barely adequate to describe what followed — the development, with in the span of a single lifetime, of virtually every back information virtually every back information technology still in use a century letter.

later:
These included not only the four business innovations already mentioned, but also telegraphy and relary power printing (1840s), postage stamps and a transatlantic cable (1850s), paper money and modern bureaucracy (1850s), the telephone and switching exchange (1870s), punch-clock (1880s), motion pictures, magnetic tape otion pictures, magnetic tape cording and four-function calcu-tor (1890s) and electronic



nics, we've stashed the cost of symbolic pro-ile boosting performance and reliability. So in get unparalicind productivity at a surpris-

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With the total integration of Symbolics Ge are environment—including Symbolics Co sion, generations ahead of the competition marker range of tools for development complex applications from AI to simulate ed software engineering. And the 3600 easy to integrate symbolic processing w

brudensting (1900s).

brudensting (1900s) and brenistons market a Salarctical discontinuity, the shall the brudenst of the shall the brudens energy, the late of the shall the s

Into type.

Bubbaga's designs followed by
only six years his work on control
of the British postal system and by
one year the publication of his
every and Hauntfeatures, a pionesing treatise on industrial control
based on enhanteris empirical
study. Bis work was latter reprinted
study, Bis work was latte

way.

A century later in 1937, Howa
Aiken, a former Westinghouse
Electric Corp. engineer teaching
spplied mathematics at Harvard,

on industrial control, Alken inclued as an example the purposive monitoring and control of the mat rial economy, what he termed the

As an appendix to the proposal which, funded by IBM, would in his years yield the identicated Mark I (is methine to rival Enter to incoin value). Altern included a giose of Rabbaghe I ISO continuity of the Control Brook continuity of the Control Brook incoince, and the Control Brook in the Control Brook in the Control Brook in many vary infector to Babbagh design. The new machine lacked a differential control and the Control Brook in the Control

Eniac itself might be seen not only as an early step toward mod-ern computing, but also as the cul-

mination of work on generatured information processing technology interrupted by World War II. Consider the intellectual as well as technological momentum the Control Revolution had gathered in the

trol ten-obstem had gathered in the final pre-war peak.

8 in 1904, Abono Church, Brail Pre-war pering published pre- and Alan Truring published and computability procedures.

8 in Berlin these same year, Kon-rad Zune began to build a untiversal bear, floating decimal point cataciton and Boolean logic.

8 in 1907, Casado Bannons published to the control process of the control process of the control work of the control wore

George Stibitz built the Errst bases relay adder.

B in 1838, the Poxboro Compa-ny devised an electronic analog computer, and Zuse completed a mechanical prototype of his hard-

B In 1939, three seminal machines — Atanasoff's electronic calculator, Zuse's binary relay com-puter and Stibitx's ATAT Model 1 — were all completed; IBM agreed

information and contral technologies continue to carry us toward possible confrontations with the prospects of artificial intelligence, computer consciousness, even synthetic life.

to build Alisen's Mark I.
Deen operanties, usually conlinear properties of the super

chine remains an important mile thurs remained to this day, a century and a half since the onset of rapid industrialization? Several forces seem to sustain its momentum willisation, processing

cres seem to sustain its momen-m. Energy utilization, processing seeds and control technologies we continued to coevolve in a seitive spiral, advances in any one ctor causing — or at least en-ding — improvements in the oth-

abung — er two.
Additional energy has increased not only the speed of material processing and transportation but also their volume and predictability,



Our information and control technologies true to carry us prospects of Ai, comr consciousness, even synthetic Ille.

continue into the near future much as it has over the contury much as a continue of the control control

but information and control innologies continue to carry us, nevertheless, toward possible frontations with the prospects artificial intelligence, computer accountees, even synthetic. Intermediate forms already as on both sides of life's boundaries eff-replicating polymers on inorganic side, genetically ensered systems on the organic series of the properties of the prop

Considering the continued development and proliferation of muclear weapons excheding, used to be control of workfords and control of workfords and control of workfords and complexity, evolution's part stage might hinge on the question of which boundary we reach first synthetic life, certainly one positive the return of the planet to the return of the planet to the return of the planet to the inorganic level, another quite position of the control of the



rests (right) learns about Univec, which was to be used to predict the 1952 election, from Presper Editori.

# Census led computer age by counting on Univac I

BY JOHN KEANE Director, Burnau of the Consus

shows by the Buress of the Con-publish, the Consus Buress of the Con-publish, the Consus Buress of State Consus Buress of State Consus Buress of State Consus Buress of State Consus Consus Buress of State Manufacture and State Manufacture an

when were to be used to profit to \$10.00 pt. On Control 1900. The final or transmissionered by the Nectional Discovered Students, which instantly received the second students of the Nectional Discovered Students, which is not second to the Nectional Discovered Students, and the Nection Students of Particular Student

The Census Bareata's Univac I, serial number 001, contained 18,000 crystal dioces, required 18,000 crystal dioces, required 18 kilowatts of electrical power to operate and weighed about 15 tons. Its nemony mile was made to the contained 19 tons, the nemony with the necessary like the contained of the contained to the contained

moved from Philadelphia to Chem.

moved from Philadelphia (Chem.

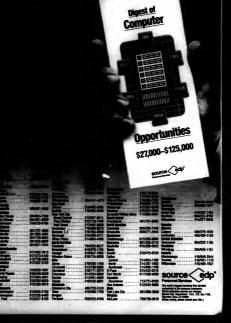
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employees who has wouse.

Univac!

Census Bureau employees are proud that their organization took the calculated risk of moving from punch-card sechnology to computers before any other non-military organization in the Communitary organization of the Communitary organization of the Communitary organization of the Communitary organization of the Communitary of the Communitary of their organization of the Communitary of their organization of the Communitary of their organization organization of their organization organiz

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# Looking back: A 1949 view of the Eniac

rate of 280 to 500 calculations cond. Division, however, is w, relatively: The rate is about calculations a second. Reading where from punched cards, 12 cond for 10-digit numbers, 12 on slower. As a result of these on, you find, when you put a oblem on Eniac, that one divi-nciany you are long as 100 delays you as long as 100 ditions or eight multiplications.

All these advantages, however, are paid for rather heavily by the low methods for changing pro-gramming. To make a change, you have to plug in large numbers of roogram trunk lines and digital runk lines, or you have to set.



new problem. Here again, we must remember that Eniac was originally designed as a special-purpose machine for solving trajectories. To calculate a large family of trajectories, very little changing of wires and switches would be

The most severe limitation on the usefulness of Eniac was, at the outset, the fact that it had

of instructions.

Checking results with Brisc is not easy. There is no built-in guarantee that Enize's results are correct, and a large calculator can and does make both constant and intermittent errors. Ways for checking with Enize include the

following:

Mathematical, if and when available, and this will be seldom.

Running the problem a second time, and this will, at most,

tice but leads only to a probabili-ty that the final result is correct. You can operate Enisc one ad-dition at a time, and even one pulse at a time, and see what the machine shows in its little neon bulbs. This is a very useful par-

Enter's next
The coat of Enter is higher
than that of reme of the other
large mechanical brains — over
half a million dollars. Because
assne of the work was done at the
Moore School by students, it is
less expensive than it otherwise
some of the work has it otherwise
of the cost was the designing of
the nanchine and the construction
of the passes; the tubes were only
a small portion of the cost, ranging
ing in prior from 20 to 80 certas
continued to the cost of the cost

many improvements can now to many improvements can now to the power required for Ensiste is about 150 kW or about 200 horespower, most of which is used for the heaters of the elec-tronic calculators using the tronic calculators using to tronic calculators using to tronic calculators using to tronic calculators and could tronic tronic tronic tronic tronic tronic tronic can consider of the power needed for Ense. Enise will doubtless give a number of years of successful op-fore problems that employ its lamitations.

note and are hot want to the limitations. In fact, at the Ballistic Re-search Laborasories, for a typical week of actual work, Daiac has already proved to be equal to 500 human computers working 40 hours with desk calculating ma-chines, and it appears that soon two or three times as much work may be obtained from Eniac.

### Computers take world closer to edge of catastrophe

BY EDMUND C. BERKELEY

The 40th anniversary of Enias which began useful operation in 1846, is an exciting occasion. Then, I was fortunate to be work-ing as an actuary at the Pruden-tial Insurance Company of Ameri ca's home office in Newark, N.J.,

larger contract.

Prudential was cautious; John Maschly and J. Presper Eckert had to experiment with new techniques, particularly writing and rending on magnetic taps. But there were troubles, and eventually Remington-Rand Corp., acquired Eckert-Maschly Computer Corp., and Bly gained Prudential as a customer for automatic committies.

as a customer for automatic con-puting,
in January 1947, I met Mauch-y and Eckert at a symposium on large-scale calculating machinery at Prof. Howard Altern Silterard Computation Laboratory, Illiand and admired them greatly and saw much of them that yeer, and so was able to write a chapter on own and the same of the same of the Control Constitution of the con-trol of the Cons

We in the computer field in some early years were full of ex-itement and enthusiasm about the prospects of computers as a enefit to humanity. But we did

benefit to himsatity. But we did not know, expect or even think, much about the rather horrible danger that have developed in the control of the control of the low. But nows about this later. Eniac added electronically at the rates of 5,000 additions a sec-ond. Previously, the top rate of computer that used electrical re-lays was about three per second. So it became perfectly clear to about the control of the control of the layer was about three per second.

600 of definements because where mobiles from external to receive the control of a personal computer of a personal computer of a personal computer of the control of the control

ry high probability that competing best errors in prepriamming, of stress, see not caught by check the property of the competing stress, and the competing stress that the competing control of the competing competing the competing property of the competing competing the competing property of the competing competing the competing property of the competing property of the competing competing competing property of the competing competing competing property of the competing co

e primary problem that has sped from the computer revo-, of which Eniac was the precursor, is that computer ists, along with rocket and

ity currently is death for more tha 5,000 million persons from a a nu-

winter, the outcome of the follow-

 A nonrestricted arms race.

The interwoven powers of ti military/industrial/governmental espiex.

B The mistakes, delusions and allucinations of government lead-

The immutable laws of proi

bility.

The recent nuclear accidents at Three Mile Island and Chernobyl and the devastation of Biroshims and Naganaki in 1945 are pale re-

Pirst, there is fear among the overs and shakers, the leader of the governors of the fragile anet Earth. They now fear th

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## Providing mankind with the ability to master the environment

the computer revolution, which we have seen accessorate since the first large

sticated observation and rapolation from hypothtrapolation from hypoth-es, we have made great ides in understanding na-re and through that un-ratanding have been able allow mankind an ever-reasing ability to master

ag - or the m



ing year, questions we hav been asking since question were first asked are being were first asked are being answered in a new way. What is life? Where did we come from? What was the beginning? Each answer re-cently has involved com-

beginnance cently has involves beginning to the technology for building computers may be maturing, as did the technology for producing books. But not all the good books but not all the good books.

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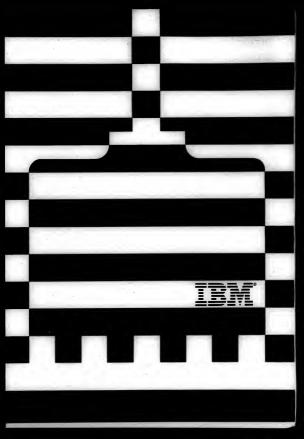
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The earliest known mechanical counting aid in the dust abacus, traced back at least 5,000 years to the cradic of civilization, the Tigrio-Euphrates Valley in southwestern Asia. The dust abacus was nothing more than a dust- or sand-

nothing more than a dust- or sandcovered surface on which figures could be drawn with a kylus. The abscus, as commonly known, was invented in China in the second century A.D. The Chinese version and the Japanese sor-

oosn - both extraoremaniy rax - are still in use today. Their efficiency was pointedly illustrated shortly after World War II, when Pw. T. N. Wood, the most skilled electric deak calculator op-

dismal defeat.

isted in all the civilinations of antiquity. In ancient Bome, it was a grooved tablet, while in China, Japea, and Greece, it remains a frame with beads strung on parallel

pan and Greece, it remains a frame with beads strung on parallel wires.

In medieval England, a simplified form of abacus was formed from a tablet ruled into spaces,

one a tablet ruled into spaces, hich represented the positions of he counters, with coins, buttons of ther small objects moved to make he calculations. The checkered to hecket, from which the British

Also in England, approximately ,000 years before the Middle Ages, tonehenge was erected on Salisury Plain. Composed of concentric tricks of massive stones and other esidered by some an early asmical calculator, Stonehenge sen shown — with the help of uters — to indicate the soland baringings of sessons as

and moon. The alignment of landmarks pointed to the rising and setting of the sun on the days of the summer and winter solutices. A later astronomical computer, this one mechanical, was recoverfrom a sumice ablp off the coast of Greece in the 1890s and attributed to the first century B.C. The device

of planetary motions.
In the first century A. D., Ges
of Aurillac — a Prench sheper
toy who later became Pope Sylter — made the first attempt in
western Europe to mechaniae t
shocas. Drawing on ideas he
gleamed from the Moors, who th
occupied Spain and Northern A.
ca, he spent many years trying
perfect his device, atthough its
er worked accurately. He arran

ros was hardly known at the ne, his device proved to be a tter than hand operations.

mess calcusting machine. There are reports of sanother. Spaniard named Magnus who there. Spaniard named Magnus who there. Spaniard named Magnus who they can be considered to the spaniar of the shape of a human head, the figures of which appeared in the place of teeth. The priests of the day are said to have the cought the device superhuman and smashed it with cubs, destroying all evidences of its average.

and smashed it with clubs, destri ing all evidence of its accuracy. The 1967 discovery of two bound volumes of Lonardo de Vi cl's nocebook materials in Madric National Library of Spain shows that the 16th century genits the cidence of calculation—did indeed softress the question. Itis drawings describe a machine the would maintain a constant ratio 10.11 in each of 112 digit-regisesing wheels. No working model is known by have existed and register large three controls of the control of the control of the large controls of the control of the controls of the large controls of the controls of the controls of the large controls of the control of the controls of the large controls of the control of the controls of the controls of the controls of the control of the control of the controls of the controls of the control of the control of the control of the controls of the control of the control of the control of the controls of the control of the contr

in 1614, John Napier, Baron of Merchiston in Scotland, discover the logarithm, by which mathem ticians could transform multiplic tion to addition and division to traction. Logarithmic tables remained the basis for lengthy computations until the early 20ti century, when mechanical calcul tors came into their own.

device called "Napier's Bones," which amounted to a look-up tab for multiplication. The "bones" were actually a movable multiple cation table comprised of bone strips on which numbers were stamped. When placed into the proper combination, these strips could nerform direct multiplica-

born, Wilhelm Schickard, a Germa professor of biblical languages an astronomy, designed a machine that reportedly could add, subtramultiply and divide. Unfortunately, the model was destroyed in a fire and a new one was never built

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# Babbage: A frustrated genius and

May you never again claim to feel frustration after reading the story of Charles Babbage, a man before his time who spent most of his life in the vain attempt to man ufacture a machine considered by ost of his conte

atterly ridiculous. In thousands of detailed drawings made 150 years ago, Babbage rojected the fundamentals on which today's computers operated with the property of the property of the 15th century had been equal to Babbage's genius, a computer would have been built in 1892. But the technology of the 15th century had been equal to Babbage's genius, a computer would have been built in 1892. But the technology was not there, and Babbage was destined to

the fruits of his labor only on per and in theory. More than a stury later, however, Howard Ai-a, director of Harvard Universi-s Mark I computer project, re-

umleigh Teape, both of Totnes ad both descended from well-sown Devonshire families. As a child, Charles Babbage di ved a great inquisitiveness

yet the causes of mechanical rkings. Upon receiving a new , he reportedly would ask, amms, what is inside of it?" If rtheoming answer was not to tisfaction, the child would d to take the object apart to

of numbers there a classical education at an and venerable grammar school oys, Charles entered Trinity age in Cambridge, England, to be continued the boyish skes and rebelliousness that refrom the boredom of often ege in Cam

knowing more than his instructors: Despite his unorthodox behav-ior, Charles was well on his way to

English.

At Cambridge, Charles's studies led him to a critical examination of the logarithmic tables used to make accurate calculations. He was well aware of the difficulty and tedious

Babbage became convinced it was tech-

nically feasible to construct a machine to compute, thereby gvoiding the numerous compositors' errors, 50 years before typewriters were

esable to the great maritime na-n, and he was contantly finding d reporting errors in existing ta

One day, Charles was o

Me day, Charles was contem-ting a problem while sitting in a en of the Analytical Society. on seeing Charles apparently in he far-off world, a friend asked some far-off words, a friend asket him the nature of his dream. It is said that Charles pointed to some logarithmic tabbles and said, "I am thinking that all of these tables might be calcusted by machinery. The idea took firm hold in Charles's mind, and after gradua-tion he returned home to begin satething a machine by which all mathematical tables could be com-nuated by one uniform process. He

athematical tables could be com-tated by one uniform process. He came convinced it was technical-feasible to construct a machine compute by successive differ-ices and even to print tables when ey were computed, thereby olding the numerous composi-rs' errors. It is noteworthy that

ge's ambitious venture wa aken 50 years before type s or typewriters

etting machines or typewriters here invented.

In 1916, two years after his mar-lage, Babbage had his first taste of rorldly failure, closely followed by

econd. His application for the ofensorably of mathematics at tindia College in Haileybury a rejected for political reasons was his application, three year or, for the chair of mathematic

Portunately, the elder Babba gracefully supported Charles an family while Charles continued family while Charles continued is feverish work on calculating ma-chines. By the time he was 30, Babbage was ready to announce the Royal Astronomical Society that he had embarked on the con-

chine.
His paper, "Observations on the
Application of Machinery to the
Computation of Mathematical Tables," was received with wide acclaim and Bebbage was presented







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# The precomputer age A time line, 500 B.C. to 1946 A.D.



m" that is able to













d draws from an inhe







England's Registrar's Office uses the Scheutz machine to predict life



Another inventor driven by the drudgery of manual calculation, William Burroughs, an American bank clerk, develops the first commercially successful mechanical adding mechine, its company is the foreuniner of Burroughs Corp.

Facing the prospect that the current census would take more then 10 years to compile manually, the U.S. Bureau of the Census uses Herman Hollerith's invention, the first electromechanical ounched-



in a less urgent but just as profitable development, American Charles Fey Invents the first slot machine, forerunner of video arcade games.

After adding a sorting machine to his tabulator and seeing the census calculated in just three years, Hollerith decides it's time to go into business for himself. He founds the Tabulating Machine Co., and contracts with census takeers soon rot in — including one for Russie's

Yugoslavian Nikola Tesla, who worked for Thornes Edison, patents electrical logic circuits called gates or switches.

Hollerith's company sues the Census Bureau, claiming that machines developed for the agency by engineer James Powers infinge on his patents. The suit is disposed of without significant action.



Thomas Wetson Sr. Is hired by Hollerith's company, now the Computing-Tabulating. Recording Co. (CTR), with 1,300 employees. The company resulted from the merger of the original Tabulating Machine Co. with the international Time Recording Co., the Dayton Scale Co. and Bundy Menutschuring Co.

The Crech word "robot" is used to describe mechanical workers in Karel Capek's play, "R.U.R."



Metson rises to president and CEO of his company, changing the same to international Susiness Machines





alyzer.

1926

Mechanical people appear in the movies in Fritz Lang's silent film, Metropolis.



Powers Accounting Machine Co., through a series of consolidations, becomes the Tabulating Machines Division of Remington-Rand Corp., which later merges with Sperry Gyroscope to

1928 Jussian immigrant Vie fimir Zwonykin invents he cathode-ray tube.

English mathematician Aian Turing publishes a paper outlining the theory of mathematical logic that illustrates computer design.



in Germany, Korrad Zuse designs the Z1 computer, with keyboo input, mechanical switches and a row of light bulbs to flesh an1938 Hewlett-Packard Co. is bunded in a garage by David Packard and Willam Hewlett to make electronic equipment.



lows State College Professor John V. Atanasoff designs a prototype for the ABC computer with the help of graduate student clifford Berry. Not patiented by lows State, the design is said to be



George Stibitz builds the Complex Number Catoulator at Bell Labs, which some say is the first digital computer. Operating at a speed of about one minute per multiplication, the computer contains 450 relays and



Zuse builds the Z3 corr puter using electromagnetic relays. Operating at three to five seconds per multiplication, the Z3 is the world's first operational calculating machine with automatic control of its operations



Colossus, an electronic computer designed by Alan Turing, helps decipher German code during World War II.



The Harvard-IBM Mark I, an electromechanical computer, is completed by Professor Howard Alken. The Mark I can multiply two 10-digit numbers in five seconds.



Grace Murray Hopper follows in Ade Lovelace's footsteps by beginning the first programming career. After entering the U.S. Naval Reserve, she works with Alken to program the Mask I.

American John von Neumann, an adviser on the Enac project at the time, writes the "First Draft of a Report on the EDVAC," setting forth the precepts for a stored-program compute



## the first gold medal award-ed by the Astronomical So-

ed by the Astronomical So-cious described to Similarly inspreas the presti-gious Royal Society, Bab-bage wrote a letter to Its president, für Humaher III-tolerable babour and fraigh-ing monotony of a contin-ued president of the Continued and afterwards magnitude the lides of a machine that III was described to the second of the Continued of the III was described to the and afterwards magnitude the idea of a machine that "by the aid of gravity or any other moving power" for one of the "lowest occu-pations of the human Intel-

A worthy some
In 1834, the society
agreed that the cases was
worthy. In July, Babbage
received 1,500 pounds "to
enable him to bring his inwettion to perfection in the
manner recommended."
In developing his Differsoci Ragine, as Babbage
mathematical inventions of
several predecessors, notably
Charles Mahon, Third
Eart of Stanhope. A worthy cause

everal predecessors, nota-bility of Shashops. Third-bil of Shashops. Besidest the gradually papearent implementation that of Shashops. Besidest the gradually papearent implementation to papearent implementation to roblems also arose from a shashop and the first bil-ter of the shashops are shashops and shashop and the first bil-shashop are shashops are shashops are second property. Finally any permutations, in-reversessing and modifica-tion of the shashops are shashops and any permutations, in-reviews that are shashops and any permutations, in-reviews and modifica-tions during the mexit four respects that to the heigh-ling became of the need-place and the shashops are shall be a specially created tools of the machine. Bal-

Seciols the implementation problems connected with the Difference Engine, problems cross from a misunderstanding between Exibility and the British government, both of whom

ded the machine as personal property. This caused ms for the next 20 years, deloying Sabbage's work on the engine while he awalled further funds.

begs apparently had mis-calculated his tash; con-structing the sach; con-structing the sach; con-tracting the sach; con-tinues what he was given. In 1827, in the saids of publishy was overwhelmed by a series of personal trag-often that included the publishy was overwhelmed by a series of personal trag-often that included the publishy was overwhelmed. These events took their man two of the follows. These events took their includes the publish of the publishing that the publishing the safe publishing the publishing that the publishing that the safe publishing the publishing that the publishing that the safe publishing the publishing that the publishing that the safe publishing the safe that the publishing that the safe publishing the safe that the safe that the safe publishing the safe that the saf

Holp from Wellington
In the victor of Waterloo, Dabbage found someone who could truly grant
the principles and capabilities of his machine, and the
two remained friends for
the rest of the duke's life.
The British government
shortly thereafter granted
him another 4,500 pounds,
with a promise to furnish
remunerative sums upon

with a promise to furnass remunerative sume upon completion of the machine. Babbage was struck by yet another brainstorm — he would design a machine that would be easier to construct, have greater versatility and operate faster than the Difference Engine.

Analytical Engine, would go beyond the Difference Engine and perform all arithmetic calculations, as opposed to a limited set, and would combine these operations to solve any

Engine Seatows
The Analytical Engine
included most of the ossential features of today's digical computers, expensed, in mechanical terms. The
machine was to be divided into two parts — the
"mill," in which arithmetic
processes were carried out, and the "store," which contained the data to be
worked on, as well as intermediate results.

tained the data to be mediate reads.

The store would consist.

The store would be selected from the store, operated upon and the result.

The construit of the whole the construit of the whole the construit of the whole the store that the store is the store. The construit of the whole the store is the store.

The construit of the whole consistent was the store that the store is the store in the Jacquard waving loom. Invested in 1801 and for the store is the store in the store is the store in the store in the store is the store in the store is the store in the store is the store in the store in the store is the store in the store in the store in the store is the store in th

pattern of holes on each card — indicating the weaving denign — was read by plungers that passed through them. An all-important feature of the Analytical Engine was its ability to make conditional jumps. Mechanical means were provided to allow a band of cards to be advanced or backed, thereby plunger in the cards, or repeating them.

Entre Luty Levelence. Levelence, the only legislated colleges of the port Lord Byron, was to dedicate the instruction of the short life to interpreting Rabbage's Analytical Bigset the Birth Levelence and the levelence of the le

By 1843, at age 28, Lov-lace had mastered Bab-bage's plazes for his engin and was as obsessed with

Scheutz's Tabulating Ma-chine was much smaller and consisted of four dif-ferences and 14 places of figures, but it was able to print tables. To everyone's surprise, Charles Babbage did every-thing in his power to av-

the concept as he was. Lovelace channeled most of her talent and energy to further Babbage's cause. She eventually corrected

Collection students are serviced as a service of the new end of the collection of th She eventually corrected were the backward of the control of the control is backward of the control of the cont

one: note of all and the contract of the contr



time.
Ironically, Babbage's
dream was to be partially
realized by a Swedish
printer, George Scheutz,
who built a similar, workshle calculator after reading an article on the Differ

ingine in the





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# Boole: Creator of a new logic - and, or, not

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Unfortunately, his family's pover-ty once more disrupted Boole's plans. His parents urged him to forego the religious life in view of

situation. Responsive as always to his par-ents' needs, Boole decided to open a school of his own even though he was only 20 years old. While work-ing as a teacher, Boole always con-sidered himself a student as well and proceeded to teach himself the

Early in his macroway
Early in his mathematical career, Boole made a discovery without which it is said the theory of
relativity would have been imporThe fact that Boole saw what
others overhooked and, even more
importantly, recognized its significance, foreshadowed his future
mathematical breakthroughs,
which would not be truly apprecia
refutur later, or practical nearly a
century later.

ury later. nce Boole's math Once Books a mathematical care got off the ground with the right of the section became how to make his east known at a time when opporties for mathematical publicans were limited. Booke did not fong to any of the learned society that maintained their own pourse of the section of the section of the section of the different publications of the section ish mathematicians, ei-ally or through corre-

It was Peacock who, in his 1830 work Treatise on Algebra, broke away from the idea that the "x," "y," and "z" in such relations as "y," and "x" in such relations as x+y=y+x, xy=yx and x(y+x)=xy+xx necessarily repre-sent numbers. They do not. Rather, they are arbitrary marks, combined according to certain operations and symbolized by "signs" in accor-dance with established postulates. This renovation of algebra af-

that was appreciated by his con temporaries, although symbolic logic was to lie fallow for many

cades.
As late as 1910, for example, ninent mathematicians scorned it a "philosophical" curiosity as a "peacoopinca: Curiosaty curiosaty without mathematical significance. Continuing his teaching chores without complaint, Boole finally got a break in the following year, 1849, when he was appointed professor of mathematics at the newly opened Queen's College in what was then called Cork, Ireland.

devote more time to his Laws of Thought, which he continually

Thought, which he continually honed and perfected for five more years, until its publication in 1864. As Boole wrote in the first paragraph of the book, "The design of the following treatise is to investigate the fullowing treatise is to investigate the fundamental iaws of those gate the fundamental laws of those operations of the mind by which reasoning is performed, to give expression to them in the symbolical language of a Calculus, and upon this foundation to establish the edmethod; to make that method itself to basis of a general method for the application of the mathematical doctrine of Probabilities, and, finally, to collect from the various elements of truth brought to view elements of truth brought to view in the course of these inquiries some probable intimations concern ing the natue and constitution of

ie's work said in ess while it is not true in con

al to its square, it is true in the lean algebra of logic. According bole, x<sup>2</sup>=x for every "x" in his

" as its only solutions.
Therein lies the importance of the binary system for modern computers - their logical parts are in effect carrying out binary opera-

Besides logic, Boolean algebra has at least two other important applications. The first of these stems from the fact that it is the natural algebra with which to treat the combination of sets of elements e combination or sets of temerica-ider the operations of intersec-ns and union of sets. Considering so the idea of the number of ele-ents in a set, Boolean sigebra be-omes the foundation for the thecomes the foundations of probability.

### ead of his time

In spite of its subsequent impounce to many other branches of athematics as well as the develnt of the computer, Boole's mental work was to remain monumental work was to remain only a curriosity for many years. Like Babbage, Boole was a mar ahead of his time. It was not until Affred North Whitehead and Be-trand Russell published their thre volume Principia Mathematics, written from 1910 to 1913, that

serious mathematici study formal logic.

Because Boole demonstrated that logic can be reduced to very

that lagic can be reduced to very simple algebraic yearen, it was possible for Bubbage and his successors to design mechanical devices that could perform the secretary of the property of the property of the published his Lows of Thompki. Boole married Mary Everses, indee of the Professor of Greek at Queen's College. The marriage would insid only the nature years are not as the sign of the published his countries) death at the age of the property of the published his post of the published his post of the published his post of the published his published his

pneumonia reportedly contracted after he kept a lecture engagemen even though he was soaked to the

sxin.

Mary Boole, who had become a
devoted disciple of her husband,
published a pamphlet after his
death in which she stated some of his ideas — no doubt stemming from his many years as a teacher — on the need to rationalize and humanize the education of young

66 By 1958 or 1959, we realized that we had water in relatively large quartities, so to speak, and the market was a dry sponge. If we could just learn to in-troduce that water into

that sponge in acceptable form, there was no limit to where this business could go.

> THOMAS J. WATSON JR. Former Chairman, IBM

In Books a Psychology, Mary Books reconstruct a significant even in George Books in life. He told be that when he was about 17, it "Rabaded goods" him as he walked across as fined flashed good. This was a because the contract of the source, which Mary Book called "the successions." In the contract of the successions. It is not to closely pages of The Laws of Thought, in which Book cities "the error of those who re-

cites "the error of those who re-gard the study of Mathematics, ard the study of Mathematics, and their applications, as a sufficient asis either of knowledge or of dis-

It was the powerful combination of imeliect and intuition in Georg Boole that resulted in the several mathematical milestones he con-



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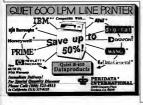
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# Hollerith: Punch cards launched the technology that changed the world

ation.

sted any statistics og Chinamen. vonamen, you run miles of

posed systems, all of whic took about eight times as long as Bollerith's to tabu

on Dec. 12.

d the records of 000,000 people and 180,000 minor civil di visions. One detail alone required the punching of one billion holes. Because the ele-

uses all the information sich appears in any way ssible." Porter contin-d. "Heretofore such ag-egations had been limit-with the machines,

The card used for the

aces constituting the dy of each card, and a cond, known as the gan

responding to each mercu-ry cup.

If a hole had been punched, the pin passed through it to make electri-cal contact with the mercu ju in the cup below. If there was no hole, the care held the pin back and no contact was made. Betwee 50 and 80 certa will contact the pinch and provide mercula was made.

controlled sorting also septiments are assisted selected cards. The sorter had a box containing a series of the selection of the selection of the selection selection

The results of the U.S. experience impressed the world, and it was not long before Hollerith's system was being used in Canada and Austria and being trie out in Italy. Prance and Germany, Hollerithreven managed to get a contract with Russia for its first census, taken in 1897.
His equipment was used. The results of the U.S.

His equipment was use ain for the 12th U.S. Ce sus in 1900, this time on a rental basis. During the 1900 census, Hollerith de-

uring Corp. to form the putling-Tabulating-Re-ing Co. (CTR). CTR, a

Hollerith, who received his last patent in 1919, remained associated with CTR until 1921. Even in 1923, he wrote of plans to develop a tabulator, simila to those later in use. Unfortunately, illines did not allow Hollerith to realize his

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## **FORMSCAN**

# Atanasoff: The judge said he invented the computer

the case of Howeywell, Inc. v. Sper-ry Band Corp. & Historia Scientific Developments, Inc.
"One night in the winter of 1987, my whole body was in tor-ment from trying to solve the prob-lems of the machine." Attanasoff testified. "Igo in my car and drove at high speeds for a long while so I could control my emotions.

The jumble of thought and inspirations that off for two years sud-only crystallized into our definite solutions

neralive memory.

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# John von Neumann: Mathematician, EDVAC designer - and salesman

# BY NANCY STERN

corporate stored-pro-nan capability.

But there was another mension to von Neu-san is influence, one that as at least as important the technical side. He as able to bring together rious groups of people puble of contributing to mputer development and oups who could benefit one it.

it.

on Neumann's ability gitimize the computer scientific tool to be I by academics was as ifficent as his specific ributions to the com-

computing devices.

Von Neumann was born
in 1903 in Budapest, Binnin 1903 in Budapest, Binnversity of Budapest, Binnversity of Budapest, pecializing furt in chemical
engineering and then in
mathematics. He received
and, in 1927, having already published several papers on algebra, set theory
and quantum mechanics.
became 8-Priosidosersa in
1909, Priosecon University
invited him to be a visting
incitator.

1909 of the priority invited him to be a visting
incitator.

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1909 of the priority invited him to be a visting
incitator.

1909 of the priority invited him to be a visting
incitator. invited him to be a visting lecturer, an appointment he held for three years. in 1983, he received a permanent position at Princeton's newly created Institute for

As Stanislaw Ulam, s

s when very early he d toward applications thematics or when he

about processes in quastions and the same of World War II, you Neumann's knowledge of mathematical physics proved of great the process of the process of the same of the same



lied cause.

During and after the
war, his main professional
interest shifted from pure
to applied mathematics, a
reorientation that lasted
until his death in 1867.

"The year 1940 was just
shout the halfway point of
you Neumann's actentific
life, and his publications
show a discontinuous
how a discontinuous

w a discontinuous rak then," Halmon has inted out. "Until then he

Win-thus consumant.
During the war, von.
Neumann was a consultant to various gloverment agencies, including the Army's Ballistics Research Laboratory, the Navy Bureau of Ordnance and the Los Alamos Scientific Laboratory. In addition to making significant scientific contributions to these organisations, von Neumann was instrumental in pro-

practical and useful ede-ence. Ulam, in a nobitum, in an obtain-writion for the American writion for the American 1955, the year after von Neumann's destalt, pointed to this supect of von Neu-mann's interest. "Perhaps his main the-"Perhaps his main the-"Perhaps his main the-"perhaps his main the-"perhaps his main the-post modivations was to help re-establish the role of teal level in theoretical ord theoretical mathemati-cal research and of the mainstreams of ideas in the-

But punch-card equip ent was very slow and efficient. Von Neuman scame actively interest became actively interests in more advanced comput-tional equipment. His wor on implosion at Los Alam required solutions of sys-tems of nonlinear equa-tions in fluid dynamics. Since existing manual methods for solving these problems were extremely

methods for solving inner problems were extremely time-consuming, he sought an alternative. You Neu-mann sensed that digital computers might prove useful in this regard. Though you Neumann's interest in instruments for scientific calculations was shared by some innovators.

cians in general. Numerical methods can give only ap-proximate solutions of dif-ferential equations. For pure mathematicians who tend to view theory as su-peroximations were lacking in rigor and therefore todal ly unacceptable in theoreti-

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rou in touch with a technical support team whose sole priority is to master PC based products. milate some terminals, a limited number of system inters, and not all of the 5250 display attributes. Of surse you'll be able to work with IBM file transfers, at once the goods are delivered, can you work with

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nwent, a traveting satesman with in pisanos, organs and sewing hines. Corpwell offered Watso bas his assistant at \$10 a week wided he could supply his own ses to pull the wagos.

When Cornwell left the compa-

for Buffalo Building and Loan at the office of the National Cash Register Co. (NCE), Wasses spylied Co. (NCE), Wasses spylied Co. (NCE), Wasses spylied Co. (NCE), Wasses spiling the Serveral attempts, but finally Wasses convicted Wasses and Co. (NCE), but finally wasses of the National Control of the National Co. (NCE) was the National Co. (NCE) without a sale, Range Iti into the specific design of the National Co. (NCE) without a sale, Range Iti into the specific designed to open his eyes to the realities of selling.

ing.

Open his eyes it did, and just when Watson had decided he would quit his job at the end of Range's speech, the tone of the trade changed completely, and Range suggested the two of them go out together and try again to sell some machines.

and try span in out loose. The machines.

William Vision was promoted to manager in supported to manager in the control of the machines. The manager is was given to the errority and the in "the claimed. But Wassen det Line It, "the claimed. But Wassen det Line It, and manager is the highest of the business world. I make the highest of the business world with the highest of the highest claim was not shown to the highest claim was not shown to the highest claim was not about the highest claim was not shown to the highest claim with high claim was now about the highest claim was not shown to the highest claim with high claim was not shown to the country. No tone was worth NCR.

The shown that the highest claim was not shown to the highest claim with the country. No tone was with NCR.

The shown that th

to have of its connection with the person of the control of the co

neeman a him out.

By 1907, the secret was out, and NCR announced that Watson was in charge of the company's second-hand business. Now the third most powerful man at NCR, Watson was 53 years

In the midst of Watson's saterial good fortune, he set the woman who would tand by him through thick

and thin, the beautiful, well-bred Jeannette Kit-tredge, daughter of a suc-

tredge, daughter of a top-cessful Ohlo businessman.
Watson was 38 and Jean-nate 29 when they see in the spring of 1912. A year as a second of the second the spring of 1912. A year as a second of the second deer. John Testeron pre-sented them with a summer house especially built near his own summer home. Less than six months later, Pat-teron fired Watson. I ong law of distinguished may whom Patterson fired. The president was known to cul-

in front of other company executives. Suddenly, Was seen the seen of the seen

THINK

son Sr. made "Trink" on \$50 word.

tivate strong, intelligent advisors until they reached a visors until they reached a very construction of the strong of the stro

Neground did Watson dis-ree with one of Patter-on's proposed policies, but a disagreed with Patterson

tion of technical advance-ment in the face of a grow-ing need for automatic Vith Holi

rical tan terest in technical in tion as he felt compa trol slip from is hand

trol slip from is hands, Watson recognised the na to forge abeed with re-search and development, pecially in light of superi-equipment being produced by inventor. James Fower Fowers Accounting Co. Fowers reportedly had superimentally to the con-traction of the control of the control of the control of the featured in electrical puni-lastes of Hollerith's ham operated one and a horize operated one and a horize end of Hollerith's hand rated one and a horizon sorter in place of the seveniest vertical sorte letth had designed for whed railroad offices. we yet, Powers rented thines for \$100 per

while CTR as 5156.
In October 1914, Watton stabilished a research department under one of Holierith's man, followed two years laser by a laboratory. It was there that engineer Capir Lake invented a superior printer-dister that saved Tabulating Machine Co. from ruin.

At the first CIT com-based sales meeting in 1916, which can be compared to the com-traction of the compared to the which can be compared to the com-traction of the compared to the com-traction of the compared to the compared to the compared to the com-traction of the compared to the compared to the com-traction of the compared to the compared to the compared to the com-traction of the compared to t

had done in the previous four combined.

In 1924, Watson became chief executive office of the company and its same became international Business Machines Corp. — "International" to suggest the projected scope of its influence and "Business Machines" to indicate the diversity of its

interests.
Watson was now com-pletely in charge and begs a a campaign to impress his distinctive personality on the organization. Watson felt that his workers shoul exhibit loyalty, unity, idea isse, enthusiasen and spiri-tual commitment. "You re to put your heart in

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ness in your heart," he naid.

The extreme layally Mateum extracted from his man became the second of a paternalistic chief ex-door he west.

Those who lest waited wary from a religiously referred its employers a constrycthe, obscational programs and gain celebration of the second of the second

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mazine or severa existing machines. machines. machines. machines in machines. The machines was a severa may respected in ventor James Bryce, Alken broached the possibility of such a project. Upon Bryce's presentation of the idea to Watson, whose faith in science and technology was aboundless, 3600,000 was made available. The war threatened to stop the project before it began, but when the U.S. Navy, in which Alken was a lectinears, realized the state of the project before it began, but when the U.S. Navy, in which Alken was a lectinears, realized the Navy, in which Alken was a licutenant, realized the value of such a device, Al-ken was released to com-plete the work IBM as-tigned as engineering team led by Lake to help Alken, and the project was under way.

Five years later, in 1944, the Automatic Sequence Controlled Calculator — familiarly known as the

The extreme loyalty Walson extracted from his men became known as the "family spirit," and if anyone felt a bit too put upon by the emotional demands of a paternalistic chief execulive officer, out the door he went.

ries were named Watson usiness Machines. When World War II hos-

beatness Machine.

Milliso began in Europe,
Wasson part all the Bill for Milliso began in Europe,
Wasson part all the Bill for Milliso began in Europe,
Wasson part and the Bill for Millison part and the Bill for Millison part and the Billison part and the Billison

contained more than 500 miles of wire.

The device could handl 23-decimal numbers and perform additions in 0.3 seconds. One and a half minutes were needed to determine a logarithm to 20

decimal place.

Thinking of his accomplishment as "Bubbage": a realishment as "Bubbage": dream cores true. Which it certainly was, Alkem made entainly was, Alkem made meet in taking full credit for its development. On the eve of the presentation ceremony, Alkem is sadd to have situational the likely it. Knowledging Watson's and IBM's part in its develop-

ment.

As a man who enjoyed getting the credit due him, Watsen was enraged. "I'm just sick shoot the whole thing," he reportedly said. And to Alizen he stormed, "You can't put IBM on as a posteoriet. I think shoot IBM just as you Harvard fellows do about your university."

versity."
In a bid for revenge and an attempt to eclipse the flear's, I watene ordered his engineers to come up with a stunning machine. Before they could do that, however, the first fully operational eiectronic computer was developed at the University of Pleansprivania in 1946.

Of the managements in several to the control of the

partment.
A bit reluctantly, but recognising the leadership consistently shown by Ton Jr., his father, on May 8, 1025, 200 core the noof. Jr., his father, on May 8, 1966, gave over the posi-tion of chief executive offi-cer to his son. De June 19, just over a month later, Tow Watson Sr. died of a heart attack at 82. In the 39 years between 1914 and 1953, IBM had seen assets increase by a factor of 24, employees by 34 and data processing business by 316. Development expandi-

Development expandi-tures had increased more than 500 times, manufac-turing space had mush-roumed and the education-al program that began with impressive takes had a revolved into an animal pro-port greatest assets are men, "Waxoo had always said. And of him, when he, died, his minster eald, "In-tegrity was the root of his character."

term develop

# A walk through The Computer Museum

with Gordon Bell

The Computer Missease Manuscript Largest Annual Research Largest Large

BELL: In a way, The BELL: In a way, The Computer Museum is just like a computer. We had a prototype to test whether it was a good idea and what the clientele would be. Only DEC employees and customers visited the museum when it first

minutes who has it first; "The "Search of the state of

## that I thought were really going to be important.

A the entrance to The Compute seem stands Whithwhol, an ex-mental computer started in 5 of MRT that oventually yielder first core memory. Only one dol of this 16-bit computer was managed it operated from

model of this 16-bit computer was over produced; it operated from 1980 to 1999.

BELL: Whirlwind was the first real-time and control machine. It's here in part because it was the origin of the machines that came out of the New England region. It's a classic mini — as big as a house — and it has lots of firsts, includ-

parailei ve I/O.

netive I/O.
Whithwind was a controvernial project because the machine took longer than they thought it was going to take to build, and they spent quite a lot of money doing it. But once it was up and people spent quite a lot of money doing it for an active in the spent quite and the sp

onal [John] von Neumann-style alculating machines of the time. MIT conceived Whirtwird as a muiator for aircraft stability. simulator for aircraft stability. That was one of the reasons at the ended up with a short word length are not the transit of machines were serial and slow, while this one was parallel and

very fast.
One feature of exchines is that you never know exactly One hundred or

what you're going to get out of them. The MIT/Forrester for con patent for core memory came out of this project. The standard Williams tube memory in use at the time was so uncellable that the

I'm glad they unreliable that the Whirlwind design-ers said, "We've got saved all that ers said, "We've got to have a new mem-ory." One memory was first tested on the Memory Test Computer [MTC], which [DEC President] Ken Oisen engineered. The MTC ran for about a month. The memory accessed.

a month. The memory operated so well that the engineers just took it right out and put it on Whirtwind. Around the center alt several large pieces of equipment that to-gether make up the U.S. Air Foods AIVFS Q-7, developed by Jay Formster and Robert Evenett of NET's Lincoln Laboratory, Installed in 1985.

and decommissioned in 1983, the 32-bit Q-7 ran lenger than any other computer, and was the first to serve elmultaneous woors. LL: Whirlwind also ended up ng the prototype for the Se tomatic Ground Environme niriwind 2. Later, IBM bulli it under the name AN/FS Q-7. MIT helped design the architecture and the circuits, and then IBM bullt these massive vacuum-tube machines. This was a 32-bit computering on the computer of the property of the computer of the com It was a lovely machine becit had two 16-bit words that or be operated on in parallel. Each pair used 55,000 vacuum tubes as took 150,000W of power. The ma es and

e you see here to the mu whas decommissioned only two years ago, in February 1963, and still ran at a phenomenal 99.56%, uptime because of careful design and an absolutely controlled environment.

rotament. Notice the way it's built — a constant stream of air blows on each tube. Every tube is running at the same temperature. In addition, the users dis something called "marginal checking," which meant they varied the voltages up and down to detect whether a tube was going to fall. by the simulation of the control of the control

reliability computers.

On a museum field trip, we saw
the AN/PS Q-7 before it was decom the AN/PS Q-7 desires it was occom-missioned. People operated the computer from this console of lights and switches. Today you can't see what's happening on a computer, but in the early days of computers there was a light on ev-

ery bit.
You flipped switches to comput
data, and you could see everythin
that was happening inside the machine. If the machine stopped or
you wanted to run it slowly, clock
by clock, you could see the whole

te exa state exactly.

I have programmed in machine language, bit by bit. In fact, until you get that first level of software on machines, you have to operate all machines bit by bit.

200 years from

now. I want

people to come

and say, 'Gosh,

shaff."

y Unit 2 from the AN/ FS Q-7 stands 6 feet tall. It was consid-ared a very fast memory. Any word in the Q-7's core mem-ory could be ac-cessed in 8 mose. BELL: This re-

tor-size cabitic uni This memory was one of IBM's cont

s to the proj . It stored only 4K by 32 bits — 131,000 bits, or one half of today's 256K-byte chip,

half of today's 2006-byte chap, which as you know is a very small fraction of the size. Later, they had a 64k-byte version, but this was really quite a small memory. That's why they needed all the drum units, which were used to swap programs with core. To show you the scale, each of these large drum

tne scase, each of these large drum units equals roughly one small floppy — shout 256K bytes. Getting rid of all the poor memories and switching over to core was a major transition. It occurred in the late '50s, even though the core was first operational in '50. It took that long to get core into other

Cores hit the market simulta-

Cores hit the market simultaneously with transistor circuits, and that occurred almost precisely in 1960 — the beginning of the second generation of computing. The year 1960 was a wonderful year, when a tremendous number of classic machines came out. Many were transistorized, and they all had one memories. That year was the bacterian of serious computing.

U

ive, fast ma That's what really m

ag start to grow ext

For many Americans, in the 1980s were synon believe. "That marvelous brain" was first introduc penceral public by CBS no fluiter Cronkits during reads."

waster Creative same our 1902 presidential elections. BELL This is the Univac I that the Eckert and Mauchly company built. It really was the first com-mercial computer. When I say "first," I have to be careful, parti-ularly saying the "first commer-cial." There were a couple of computers already operating in England, such as the Leo computer but it's very hard right now to pin down when those were actually

When you say "first" you're ing, "When was it that a cus-ser had it in his site, actually ng it?" You have to read all the

using it?" You nave or re-fine print.

There were 46 of them, which at the time was massive volume. The price was about \$690,000 initially, and it declined over time.

The way to really see machines they were used at

The way to really see machines is to see how they were used at that time. The films the museum preserves and shows are really inportant for just this reason. They show, for example, what key punching was really like or how Eniac was used. Here's the first film on programming a data for the film on programming a data for the first film on programming and the film of the film of the film on programming and the film of the film on programming and the film of the film film on programming, and the first Al film and one on the introduction

of Fortran. We also have a film made for the museum just when the last IBM Stretch was taken out of

When meseum has a videotape of water Creative Italians about the first time Universe predicted the 1986 election results. During the election, there was concurrent reporting about the election and the protring the election and the ber there was a very different attack than you see today, when everyone says, "Computers have resulty founded up elections. Computers shouldn't be allowed to predict results because that will infruence results because that will infruence oum has a videotape of

The response then was at

ment, absolute amazement: "How can this thing know what's going t happen after only a few hours?" The film the museum has of Cron-lite's announcing doesn't quite match the amazement of the mo-

This machine was literally tell-ing us what was going to happen. In fact, it seemed so cerie that the networks were refusing to use the results at first. The computer made an early prediction, and the net-works didn't even put it on the air ntil later on be-idn't believe it. they just

tion of card I/O tect the original semiari in solid oak cabinet

BELL: I was fortunate en not to deal with cards much. I did one year as a Fulbright scholar and ed cards all year. I swore I would ver punch another card. Then I went to Carnegie-Melion

University in 1966 as a professor, and they had an IBM machine with cards. I decided to write a book stead of computing — there was way I was going to put cards in

no way I was going to put cares in a hopper again. I was spoiled. I had just built the first time-sharing machine at DEC, so I really didn't believe in batch processing at all. All the DEC ma-

chines were interactive, and we be-lieved in having people talk directto computers.
But the general level of user

friendliness was still quite low at that point. The Apolio Guidance Computer here was used in the first Apollo space vehicle in 1962. Unfortunately, somebody took a piece off it, so we had to cover the

piece off it, so we had to cover the console with plexiglass. Below it, a [Hewlett-Packard] 150 computer performs the same function at the Apollo. When peo-ple play with it now, they say, "Oh, this is awful. The human interface is terrible." We answer, "Yeah, that's the way it was." They ask.

now did they ever really introl the spacecraft?" the great difficulty. Also while I was at Car-gie-Melion in the early to, I went to a seminar on M's minicommute." er. It was er on it was this car er with these little, tandard cards IBM introducing. And 1 ght, "Oh my God, do know? Cards are

are a perfect example. Just when it was clear that

when it was clear that there was no clear that there was no clear conced for cards, the internoced these new 85 col. cards. If they weren't as high the logic rest, you could have a could be chapper. That was all the little cards had one commend them.

The trick in may technology in knowing when to get on the bandwagen, known on the bandwagen, known on the bandwagen, known

ing when to push for change and then knowing when it's dead and time to

The property of the control of the c

um has a copy of the advertisement that run in The Bill Steed Journal of the Theorem and the Steel S

BELL: The purpose of this exhibit is to mark a period, 1950 to 1950, and to show a range of firsts, from basic technology to specification. The exhibit ic technology to all the m by 1950.

A factor worth by your case of the real of



wind, outdated monitoring tech-ses can leave you in the dark. The EXPLORE\* family of performan monitors from Goal Systems can sh ore light on performance problems an older, more limited products. EXPLOREVM and EXPLORECICS

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Gnal Systems Software Solutions

THE COMPANY TO WATCH one after that was when we started using the ASR33.

s early period was Atla signed at Manchester iversity. I saw it in '61 and the museum has some artifacts from it. At-las was the first virtual

ory machine, using Again, the 12-year time delay for a major product introduction — Atlas came introduction — Atlas came out as a research machine in '61, but Manchester's first machine ran in '49. It took them that long to find that two-level store is what you want as a program-ming environment. DEC ming environment. DEC started building computers in '60, and by '73, we had a good virtual memory on the PDP-10. We were building minis — or what became minis — in 1966, and the building

minis — in 1966, and the PDP-11 had a good virtual memory on it by '78, when VAX was introduced — 12

BELL: In the PC Gallery we have one of the Lines we have one of the large [Laboratory Instrument Computers] that came out in '64 and which I think of as the first personal com-puter or scientific workstation. It had a personal fil-ing system, keyboard and interactive display, and it was transportable. It cost about \$40,000. Linc

about \$40,000. Line marked the beginning of a line of computers that in-cluded the Line-8 and PDP-12 for personal, scientific and interactive computing. There are still Lines in use. Line has all the attri-

butes of a personal computer, It's for one person, it's

er. It's for one person, it's interactive, you can go automatically from program definition to execution without any intersediate paper tape or cards or anything like that. But the main thing is it was used by one individual.

I think the issue of de-

I think the issue of de-fining a personal computer is really one of scale. How much are you going to pay for a computer for one per-son? And what does it do? The purpose of this ex-hibit is to display things you can't see in stores or in schools. It includes the

first personal computers, like Linc and Altair, Apo s first workstations as her artifacts. All the m ines should have their The trick in any technology is knowing when to get on the bandwagon, knowing when to push for change and then

knowing when it's dead and time to get off. The other trick is not to get on any wrong wagons.

ive, scholarly coll

by memory 1975, a 4K gy. in tair was built using first a 1K and then the 4K chip. In 1978, the 16K chip was quickly incorporated into the Apple II. In 1981, the IBM Personal Companier. Personal Computer e out using the new

64K chip, and then in '84, the 256K chip begot the AT as

re. I don't be ve anyone really inve word for it. A lot of the a driving devil. It con-spires, and if there's a or cept half there or a com-puter half designed, technology will complete



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ed. Computerland's Bill lard, who is on the murland's Rill



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T1 and other common carriers You can hardly call it "local"

cause no one integrated it with oth systems. The PDP-6 was imp

In retreapect, for example, I don't look at the microprocessor as go invention. It was something we were all trying to do for a number of years. One day the technology reached a point where it could be done. In this case, it was a conspiracy between a good chip and ade-

me. In this case, it was a compa-parament of the parameter of the paramet

remain by has been taken to come from his breach, acting with the sound photon of the decreas, or work of the photon of the decreas of the control of the co

ected, all start suck-ected, all start suck-e, and basically peo-mough time for horb

ISS and ran three times for ISSI's Stretch. ILL: CDC's 6600 No. 1 — s ninchild — is preserve then the 6600 was an-

nounced, I remember being just awestruck by it. I put it with Ati as one of the greats.

The 6600 represents special or

area (utilit President Thomas I.) attors Jr. 's comment about the real control of the control of the con-cer. 'I understand the Co. 'I understand the control of the control of the attors of the control of the control of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the state of the control of the control of the control of the state of the control of the control of the control of the state of the control of the control of the control of the state of the control of the control of the control of the control of the state of the control of the

neurod by Gorden ben so be-powth of the POP-5. ELL: The PDP-8 was the first computer. The reason it can be ed a minicomputer is that it was a small enough to fit in a cabiand therefore it became a com-ent to other systems. Further-e, it was fast and easily s-produced. The PDP-5, its predecessor, came out about two years carlier. It was the forerunner of the PDP-8, but I don't classify the PDP-

ativity in a number of supertia: It executed many instructions simultaneously, and they were all interactions simultaneously, and they were all interactions are considered in the second of the second simultaneously and second sec

The PDP-6 was implemented in a sumber of other technologies. By 1978, it was on a single chip that insersil (Systems, Inc.) built. In fact, the number of sales of the PDP-8 has been higher in the last three or four years than at any other time because it's insule a word processor — the Decmate. So this one ma-chine has itsend 29 years. Not bud. 66

Thank you for your computerized letter asking me the role computers play in society, how I use them at home, how they have changed my life and how I feel they will change

now I jeet they will change society in the 21st century. I do not own a comput-er. Maybe one of the rea-sons is that if I put a name like Erma Bombeck

into my computer, it would come out 'Dear Mr. Bombeck,' as your letter did. I don't think computers will make it in this century — or the next one — until they know the

difference between male and female.

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# Eniac, where are you now? Pieces of it still working

### BY MICHAEL SULLIVAN-TRAINOR

Though its plug was pulled morthan 31 years ugo and its parts scattered among a host of collectors and historical institutions across the country. Eniac, or at least part of it, is still capable of operation.

The majority of the computer, conceptions and applications on considered the marvel of the age, is stored away or on display the Swithstein Intertitation in the Swithstein Intertitation in also preserved at its birthpiace, the Moore School of Bectrical Engl. incertiag, at the University of Penn astic Park Computer of Penn aste have collected pieces and stored them at the U.S. Millitary Academy at West Polita, N.Y.; the Total Computer Mouseau Co

in Boston. But out of all these collections, there is only one place where part of Eales etil operates on an infrequent basis. The pleces, two small accumulators, are housed in Ange Hall at the University of Michigas where from time to time they are used to run computations to demostrate how the first large-scale electronic digital computer actual

worked.
Forty years ago, Arthur Burks, then a 31-year-old engineer, was a member of the 60-person team, led by J. Presper Eckert and John Mauchly, that bulk Enias. Today, Burks, a 71-year-old professor of philosophy, electrical engineering and computer science, still maintains the accumulators to give dem

gan.
"Only an old engineer would have the interest and the ability to revive the original pieces of Eniac and get it working again," says Bruso Brusoner of the Babbage In-

sota.

The pieces are two of the 20 original accumulators that made up Eniar i memory. They logged a total of 80,000 hours of computation during into years of useful life as part of the original machine. Now, though the storage power of Eniae is available in a hand-held calculator, the accumulators are still exon.

Burks.
Each containing 100 of Eniac's

accumulators received their information for computation from the computer's large multiplier. To replace this device, Burks has intailed two Digital Equipment. Ours. control modules. Built in the late 1950s, the modules feed sig-

mass to the accumulators in it a manner similar to Eniac's in multiplier. The computer now operates at: very slow average speed of 5,000 pulses per second, compared to Er iac's original standard speed of 100,000 pulses per second.

Despite its small size and unusus al combination of parts, the system operates in the same manner as the original Eniae. To accomplish a calculation, Burks flips switches on each accumulator, corresponding the digits and operations sign. The answers are represented by neon

In 1949, Burks came to Univerty of Michigan to pursue his doct ate in philosophy. Though an avresearcher of computer history, Burks says that he did not anticipate the developments that have taken place in the 40 years since

"When we were building Enisc.
some people recognized that the
fundamental physics allowed one
to use much smaller components
than the vacuum tube, but I don't
know of anyone who anticipated
how fast this revolution would go



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